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# BARK BEETLE CONDITIONS IN THE CONIFEROUS FORESTS OF FOREST SERVICE REGION 4

November 1961

By

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Entomologist

BRANCH OF FOREST INSECT AND DISEASE
PREVENTION AND CONTROL
DIVISION OF TIMBER MANAGEMENT

Forest Service
U. S. Department of Agriculture
Ogden, Utah

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# BARK BEETLE CONDITIONS IN THE CONIFEROUS FORESTS OF FOREST SERVICE REGION 4

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## INTRODUCTION

This report presents current information on infestations of bark beetles in conifer stands on lands of all ownerships in the territory covered by the U. S. Forest Service, Region 4. The Intermountain Region (4) territory encompasses all of the states of Utah, Nevada, the western half of Wyoming and all of southern Idaho.

Briefly, the current situation is one of explosive buildup of mountain pine beetle (*Dendroctonus monticolae* Hopk.) activity in most of the region's lodgepole pine stands; static to decreasing tendencies are recorded for the Engelmann spruce beetle (*Dendroctonus engelmanni* Hopk.) Black Hills beetle (*Dendroctonus ponderosae* Hopk.) activity is at a low level. The Douglas-fir beetle (*Dendroctonus pseudotsugae* Hopk.) continues to decimate some Douglas-fir stands at an alarming rate although apparently decreasing in a few areas. Other bark beetles are epidemic in localized areas.

The information on the infestations presented in this report was obtained through cooperative detection by forest workers of the U. S. Forest Service, other federal and state agencies and interested private landowners. In addition all forested lands within the regional territory were covered by the annual aerial detection survey conducted by entomologists of the Division of Timber Management. The entomologists made an on-the-ground inspection of nearly all of the trouble areas detected. Those that have not been inspected to date are scheduled for examinations this winter or next spring. To insure the evaluation and prediction for each infestation is as reliable as possible, entomologists collect and record on evaluation sheets biological data regarding factors that are influencing or could influence the trend of an infestation. It should be recognized that no formula for predicting trend of bark beetles has been devised, instead the predictions are based on a review of the data in its entirety, tempered by the entomologist's judgement.

This report is a consolidation of information on bark beetle infestations occurring in the Forest Service, Region 4 area, during 1961. Infestations on lands other than national forest or parks are reported in the section covering the nearest forest or park. The objective is to present the entomological significance of each infestation. A map of the region showing relative position of the infestations and detailed maps of each are appended.

## MOUNTAIN PINE BEETLE

### Payette National Forest

A mountain pine beetle infestation on the North Fork of the Payette River extends from the edge of the town of McCall, Idaho, south along the river for about four miles. This infestation is in a stringer of lodgepole pine running along the river bottom. Approximately 5,000 to 6,000 trees are currently infested. Most, if not all, of the infestation is on state and private land. The infestation is definitely of epidemic status and built up rapidly from scattered groups of "red tops." Brood population was not as dense as usually encountered in Region 4 infestations, but the buildup ratio exceeded three to one.

This infestation does not appear to represent much of a threat to timber outside of the stringer of timber presently infested. However, if it persists at its present level or increases as it well may, much of the lodgepole along this section of the river bottom could be killed.

A small infestation of mountain pine beetle in second growth ponderosa pine was detected by the entomologists just southeast of the town of McCall. The infestation covers about 100 acres on the ridge west of Lake Fork and is probably entirely on private land. Approximately 200 trees are now infested with a pattern of groups which contain ten to fifteen trees. The condition leans toward epidemic, but brood densities are not considered heavy enough to cause any appreciable buildup next year.

### Sawtooth National Forest

Several small centers of mountain pine beetle infestations have been treated for the last few years in the Warm Springs and Big Wood River drainages. Only a few infested areas were found within the treatment boundaries. There are, however, two areas where the infestation intensity is such that loss of trees may become excessive if treatment is not undertaken. One is in the Big Wood River where scattered small groups of infested trees totaling about 200 are located around the summer homes and campground areas. The other "hot spot" is in the Middle Fork of Warm Spring Creek. The groups of infested trees ranged from 20 to 50 trees with approximately 250 trees in all.

## Targhee National Forest

Six definite centers of epidemic population of the mountain pine beetle are present on the Targhee or adjacent to that national forest in southeastern Idaho. Four of the centers are strung along the northern end of the forest from Kilgore to Island Park, one is east of Tetonia and the largest is east of Rexburg, Idaho, in the same general vicinity of the Hawley Gulch infestation that was treated three years ago. In these epidemic areas the evaluators estimate over 55,000 infested trees of which some 9,000 are on lands other than national forest.

The Kilgore-Sheridan Reservoir infestation, which is primarily on state, Bureau of Land Management and private lands, has been treated for the last few years. It now contains only about 1,000 infested trees which represent a marked decrease in the number of infested trees. The trees now infested apparently originated from the relatively small number of trees missed during the control program.

In the Snider and Taylor Creek area, which lies mostly on national forest lands, the infested trees are grouped with as many as 50 trees in the larger groups. Some scattered singles are interspersed between the groups. There are roughly 1,000 infested trees in the area. It is possible this infestation originated two years ago from flights out of the Sheridan Reservoir infestation. There are now about ten trees infested for every tree infested last year.

A few small groups of mountain pine beetle trees are scattered in the area along the forest boundary road from Dry Creek to Blue Creek. Probably not over 200 trees are infested, but this area is typical of many from which this year's explosive increases have originated.

A "hot spot" of some 1,500 infested trees is located in Tyler Creek. Groups of infested trees range from 50 to 200. The infestation is working down the slopes and has increased fivefold since last fall.

East of the town of Tetonia along the fringe of the lodgepole pine type from Bull Elk Creek to Grouse Creek several centers of mountain pine beetle activity were detected by the aerial survey. Rough estimates made by the evaluators indicate about 4,000 infested trees. This is the same general area where control work was undertaken several years ago. The infestation centers are again increasing. While these "hot spots" do not show the high density of brood found in most of the other infestations, stand conditions and general appearance of the brood indicate the increasing trend can be expected to continue.

The Moody Creek infestation east of Rexburg, Idaho, actually runs along the fringe type from Moody Creek to Carlton Creek. In some cases the infestation extends inward from the edge of type as much as five miles. Some of this infestation is on lands other than national forest. The evaluators estimate about 37,000 trees are now infested. Buildup ratio averaged eight to one, attacks extend to an average height of 33 feet, and the trees are large, averaging 16.8 d.b.h. In addition, brood densities indicate high epidemic conditions. Several small groups were detected scattered out from the main infestation.

## Grand Teton National Park

Mountain pine beetle populations have shown a steady increase on Grand Teton National Park and adjacent Teton National Forest lands since 1955. From 1955 to the present time Grand Teton National Park has been engaged in chemical treatment of mountain pine beetle infested lodgepole pine stands. In spite of the control operation that has been conducted in the Park, mountain pine beetle has increased during the last few years at an accelerated rate. Grand Teton National Park lies in the heart of an extensive lodgepole pine belt and is bordered on three sides by national forest lands that have also been infested with mountain pine beetle in the past few years.

Last year the National Park Service directed a control program in which over 18,000 trees were chemically treated. In checking the treating areas, entomologists found mortality greater than 90 percent in the treated trees and over 95 percent of the infested trees were treated. The fact remains, even though the beetle population was reduced, the potential for increase is still present.

why treat then?

This year aerial detection survey personnel located symptoms of mountain pine beetle activity on Blacktail Butte which has been relatively free from attack for approximately ten years. Ground evaluation personnel found about 2,000 to 2,500 infested trees. Buildup ratios ran as high as six to one.

Extimates of numbers of infested trees were made for each unit by the evaluating entomologists. The following table gives biological evaluation data and includes the entomologists' estimates of numbers of infested trees.

| Unit | DBH | Brood per sq. ft. | Gallery starts | Gallery inches | No. of infested trees |
|---|---|---|---|---|---|
| Pilgrim Mountain | 11.8 | 249.2 | 9.6 | 115.0 | 2,500+ |
| Two Ocean Lake - North | 13.0 | 304.0 | 8.0 | 115.8 | 1,000+ |
| Emma Matilda - North | 12.7 | 260.8 | 8.4 | 86.0 | 800+ |
| Emma Matilda - South | 15.1 | 249.2 | 7.8 | 95.2 | 1,000+ |
| *Pacific Creek | | | | | 500+ |
| *Signal Mountain | | | | | 1,500+ |
| *East Signal Mountain | 12.4 | | | | 2,000+ |
| Blacktail Butte | 13.2 | 226.8 | 6.8 | 118.2 | 2,500+ |
| *Donoho Point | | | | | 500+ |
| | | | TOTAL | | 12,300+ |

* Brood density not sampled.

The figure of 12,300+ infested trees represents the bulk of the major infested areas. It is recognized that small isolated hot spots may contain 2,000 to 3,000 additional infested trees. Therefore, Grand Teton National Park was advised that a total of 15,000 trees is probably infested.

Information gathered in the 1961 field season shows an alarming increase in brood potential and in the number of trees attacked on and adjacent to Grand Teton National Park.

Continuation of the chemical control program on Grand Teton National Park is warranted from the entomological viewpoint.

## Teton National Forest

Lodgepole pine stands on and adjacent to the Teton National Forest have a long history of mountain pine beetle activity. Since 1956 epidemic centers have been chemically treated. This fall aerial detection surveys located several new infestations and extensions of old known attack centers on the Teton National Forest.

### North Teton

Very effective control

Ditch Creek has been treated for the last few years. Fall evaluations showed brood densities to average 306.0 per square foot. Operational surveys estimate over 7,500 trees are infested on about 1,000 acres. The buildup ratio was about ten new trees for every tree infested last year.

Aerial observations in the vicinity of Lost Creek (due west and adjacent to Ditch Creek) showed about 5,000 currently faded trees occurring on about 1,500 to 1,800 acres. During the ground investigation entomologists recorded brood densities as high as 315.6 per square foot. The evaluators estimate a buildup ratio of around four to one. Chemical treating was undertaken last spring on portions of Lost Creek and Ditch Creek, however, considerable numbers of infested trees were left untreated because of insufficient time and funds. This factor plus the large buildup ratio explains the rapid increase of infested lodgepole pine in the Lost and Ditch Creek drainages.

!

The mountain pine beetle continued its upward trend in Pacific Creek for the second year. Aerial observations indicated that new fading was occurring near old groups and adjacent to this area a new center was detected. Collectively it appeared that 1,500+ trees on about 500 acres had been attacked. Brood densities averaged 200.0 per square foot. The overall impression was that the beetle would continue to increase.

Two areas in the vicinity of Blackrock Ranger Station (Rosie's Ridge and south of the Hatchet Motel) are currently infested with the mountain pine beetle. At the present time approximately 1,500 trees on Rosie's

Ridge are infested on about 500 acres. This is a new center of infestation which has not reached its biological peak of activity but appears to have the potential to increase rapidly. Large quantities of suitable host material surround the infestation.

In the same general vicinity (south of the Hatchet Motel) brood densities of 278.0 per square foot were recorded. Evaluators reported 300 to 500 acres with 1,500+ infested lodgepole pine. Insect predators and parasites were scarce beneath the bark of all infested trees sampled. This area is also surrounded by large stands of uninfested type.

North of Two Ocean Lake there are several large groups of faded lodgepole pine near the boundary between Grand Teton National Park and Teton National Forest. Probably a considerable portion of this infestation lies in the Teton Wilderness Area. Estimates show approximately 2,000 trees on about 1,000 acres. Brood densities were very high averaging 300 to 400 per square foot. This area also has a repeated history of mountain pine beetle activity. A limited chemical treating project was conducted in 1958 in the general vicinity of Two Ocean Lake. Large areas of susceptible type surround the area. Esthetic values of forest wilderness and national park land are being threatened.

## South Teton

For the last six to seven years mountain pine beetle activity has persisted in spots throughout the Hoback River drainage. Chemical and logging controls have been used effectively. There are now several relatively small epidemic areas outside the recent project units. The two largest areas of attack occur in Jack Creek and on the Hoback Rim near Kismet Peak. The latter infestation is on state and private land. Considering biological factors pertinent to the infestation, the Hoback country should be given a lower priority than those infestation centers to the north.

One area in the South Teton block that should rate a higher priority is Cache Creek. This drainage flows west into the town of Jackson, Wyoming, and is due east of the skiing center on Snow King mountain. Presently 100+ trees are infested on 100 acres. Brood densities averaged 196.0 per square foot and the overall picture indicates a definite increasing tendency.

## Bridger National Forest

A small infestation of mountain pine beetle is present in the Green River Lakes campground. Approximately 60 to 70 large diameter lodgepole pine are infested. Brood densities are high and the buildup ratio was approximately six to one. This highly used campground has held a relatively high level of infestation since 1957. Sporadic treating has been done, but the increasing tendency of the beetle has persisted. The campground is bordered on three sides by the Green River Engelmann spruce beetle epidemic. However, the former infestation is separate and definitely mountain pine beetle rather than Engelmann spruce beetle attacking lodgepole pine.

## Caribou National Forest

Several small areas of suspected mountain pine beetle activity were detected during the fall aerial survey. Subsequent ground examination and evaluations proved an infestation in Clear Creek to be epidemic with about 500 lodgepole pine currently infested. The ratio of infested trees to trees infested last year averaged one and one-half to one. While the infestation is building up and may continue to expand, the beetle potential does not appear as great as in most of the infestations in the region. Snow and mud prevented evaluation of the other suspected areas. Examination of these areas are scheduled for next spring.

## Cache National Forest

Several mountain pine beetle infestations exist in the Cache National Forest. They are located in Mud Flat, Cottonwood-Dry Canyon, Mill Hollow, Copenhagen Basin and Skinner-Co-op. Altogether, there are over 5,500 infested lodgepole pine most of which are of large diameter. The infestations are in mature and overmature stands. Average infested tree and brood density figures recorded this fall were:

| Location | DBH | Brood density | Gallery starts | Inches | No. Infested trees | Acres |
|---|---|---|---|---|---|---|
| | | (per square foot) | | | | |
| Skinner-Co-op | 12.4 | 262.8 | 9.4 | 108.2 | 2,000± | 300± |
| Copenhagen Basin | 15.1 | 205.6 | 5.0 | 42.8 | 700± | 300 |
| Mill Hollow | 13.8 | 275.6 | 6.2 | 109.8 | 500± | 150 |
| Cottonwood-Dry Canyon | 16.2 | 227.2 | 7.8 | 111.0 | 1,500 to 2,000 | 500 to 600 |
| Mud Flat | 15.6 | 322.4 | 9.6 | 115.2 | 350± | 200 |

All infestations are epidemic in nature and are expected to increase in severity barring unexpected brood mortality.

## Wasatch National Forest

The Wasatch National Forest has approximately 300,000 acres of commercial timber land; approximately 77 percent or 254,000 acres is lodgepole pine type. From timber survey data now being compiled it is estimated the annual allowable cut of lodgepole pine will exceed twenty million board feet.

A control project known as the "North Slope Project" has been in operation since 1958. This effort has been directed against a massive outbreak in lodgepole pine on the north side of the Wasatch National Forest. To date, well over 300,000 infested trees have been treated. Operational surveys run this fall show, after fall treatment, there will still be over 250,000 infested trees within the control boundaries. Biological evaluations show infested trees remaining within the areas receiving control attention in 1960 and 1961 contain epidemic populations of mountain pine beetle but somewhat lighter brood densities than those areas that have not been treated. Beetle flights in 1959 and 1960 caused a significant spread of two to three miles westward. On the west side a definite spread of some six miles to the north also occurred. These infestation boundaries now include all of the East Fork of the Black Fork drainage. Brood counts in the "spread areas" show fall larval population to be very dense, averaging about 300 per square foot of bark area at d.b.h.

what's been gained from control?

The large number of infested trees and tendency to spread is a reflection of the explosive nature of the mountain pine beetle buildup. The 1961 fall brood densities provide sufficient beetle populations to cause a similar explosion next year if brood survival is consistent with last year.

To the west of the main "North Slope Project" in the Bear River several "hot spots" of infestations have "flared up." This general area was treated several years ago and has been considered as part of the main project. The "flare-ups" in the Bear River drainage are in Cow Hollow and near the mouth of Stillwater Creek with some infestations scattered along the river bottoms between Stillwater and Mill Creek. These centers of infestation could be compared to spot fires, and unless checked their control may spread throughout the large body of lodgepole pine in the Bear River drainage.

Apparently they don't learn from experience

Infestations in the Weber River drainage are concentrated around Holiday Park and Smith Morehouse Canyon. The infestation in Smith Morehouse runs along the bottom of the canyon from Erieson Creek down to the Mud Flat Ranger Station. At the upper end of the infestation infested trees appear mostly as small groups (five to ten trees). Near the ranger station groups increase in size to over 100 trees per group.

A small hot spot of mountain pine beetle was located on the ridge at the head of the first drainage up the Weber above Smith Morehouse Canyon. Between 100 and 150 faded lodgepole were counted by the aerial observer. This area has not been checked on the ground, therefore, the infestation potential is unknown.

The Holiday Park infestation extends from the summer home and campground area into the three major forks of the Weber River. In Gardner's Fork the groups range up to 100 trees in size. Altogether over 800 faded trees are present in Gardner's Fork. The Middle Fork has only a few small groups which are located nearly two miles above Holiday Park. In the main fork of the Weber the infestation follows along the canyon bottom and extends over four miles upstream and contains over 400 faded trees. In Holiday Park itself the groups rarely exceed ten trees but are scattered throughout the lodgepole pine. Ground evaluation showed all of the Holiday Park infestation is epidemic and is expected to increase rapidly unless control action is undertaken next year.

Small infestations have been active in the Provo River for several years, mainly along the river bottom and on Iron Mine Mountain. Some treatment of infested trees has been done and it appears to have been successful in holding the loss to a minimum within the highly used campgrounds along the river bottom. This fall the aerial survey found groups of red-topped lodgepole pine throughout this drainage, and it is estimated over 30,000 lodgepole pine are now infested. The infestation centers are located on Iron Mine Mountain upriver from the Duschene tunnel, Soapstone Guard Station, Shingle Creek, Rock Creek and Rock Creek Bench but not upstream above Alexander Lake and Boulder Creek-Norway Flats. Infested trees are scattered between these centers in lesser concentrations.

Biological evaluations of the Provo River infestations show all of them to be epidemic with large increases in the number of trees currently infested over last year. The buildup ratio averages ten to one. Brood densities in all trees sampled were extremely high and will average about 300 per square foot. From the entomological viewpoint the Provo River infestation poses the greatest threat for continued explosive increase in bark beetle activity.

## Ashley National Forest

Mountain pine beetle activity has been observed on the Ashley National Forest since 1956. Several infestations did not develop epidemic tendencies and consequently control action was not undertaken; others, such as Pole Creek, developed into epidemic. Direct control measures reduced the beetle population in Pole creek to a level where direct control is no longer necessary. This year, as was the case throughout the lodgepole pine forests, many of the static infestations developed into epidemics and a number of new infestation centers were detected.

On the Manila District mountain pine beetle is at epidemic levels in the lodgepole pine from Beaver Meadows on the west edge of the district to the Summit Springs Ranger Station, and from the edge of type on the north to a south boundary of Carter Creek and a line westerly to Round Park, through to Beaver Meadows. Another small infestation is located in the vicinity of Allen Creek above Highway 44. Operational surveys estimate these areas contain 32,000 infested trees.

On the south side of the forest many areas containing faded lodgepole pine were detected, most of which have proved to be mountain pine beetle. However, not all areas have been ground checked.

### Blanchett Park

The infested area covers about one section and has about ten groups of faded trees. The groups range in size from five to twenty trees. The area is in the bottom of the drainage approximately two to three air miles upstream from a recent burn. This area has not yet been evaluated on the ground.

In Pole Creek, across the drainage from the controlled infestation, is a new epidemic of mountain pine beetle. From the air there appeared to be in the neighborhood of 600 faders. This could become serious because of the proximity of a large stand of mature lodgepole pine to the north.

In the general vicinity of the An-Kar Guard Station two new infestation centers were detected. Approximately two miles above the guard station in Dry Gulch some 200 faded lodgepole pine trees were detected by the aerial observer. A majority of the faders are singles or small groups. From the air the situation looked like it could be the start of a serious epidemic. Below the guard station and up the ridge from the big burn 30 to 40 ponderosa pine are faded and appear to have been killed by bark beetles.

Around Limekiln Springs, about three miles northeast of the Yellowstone Guard Station, 700+ faded lodgepole pine thought to be caused by mountain pine beetle were located by the aerial survey. In addition to the mountain pine beetle "faders" there is evidence of considerable porcupine and comandra rust damage.

The old infestation in Hell Canyon that has remained static for several years is now surrounded by an epidemic condition of mountain pine beetle in lodgepole pine. The infestation boundaries now extend from the head of Cow Canyon down the Yellowstone River past Hell Canyon and around the edge of timber type to the west as far as Petty Creek.

A new infestation on the Yellowstone River about two miles upstream from Cow Canyon covers about 1,000 acres. The infestation is on the steep canyon slope and probably not visible from the bottom of the canyon. This infestation was detected by the aerial survey and has not as yet been checked on the ground.

Last year we reported an apparent increase in the infestation in Lake Creek near the junction of Oweep Creek. This infestation lies entirely within the present boundaries of the High Uinta Wilderness area and is the largest infestation of mountain pine beetle in lodgepole pine on the south side of the Ashley National Forest. The biological evaluation of this infestation showed that the predicted increase had taken place with a buildup ratio of over two to one. All evidence indicates the increasing trend will continue and may be expected to accelerate, providing, of course, unexpected brood mortality does not occur before beetle flight next summer. The infestation increased both in size and in area with most of the spread being downriver toward Moon Lake. The evaluators estimate this infestation has over 30,000 infested trees.

The Moon Lake-Brown Duck infestation was treated in 1960. This infestation is centered in a heavily used recreation area that includes a campground and part of the shore timber of Moon Lake. Operational surveys show about 1,450 infested trees, but only about 100 of these are within the area treated in 1961. Most of the infestation is in lodgepole pine, but some ponderosa pine trees on the Fish Creek side are infested. The infestation is definitely of epidemic nature and can be expected to increase unless treatment is undertaken.

An infestation in Miners Gulch, a side drainage of Rock Creek, has persisted for several years. The infestation is relatively isolated above the valley bottom on a small bench. Within the last four or five years it has killed much of the overmature timber in the stand of about 400 acres. The current year's infestation has a good chance of taking most of the ramainder of the mature and overmature trees. Actually this infestation, while it shows an increasing trend, does not follow the explosive pattern found in most of the mountain pine beetle infestations in the region.

The infestation in Bear Wallow on national forest and Uinta-Ouray Indian Reservation was treated last spring. A total of 4,339 trees were treated and operational surveys now indicate only about 160 trees are infested, 100 of which are on Indian lands. Outside the main infestation there are about 300 infested trees on Indian lands needing treatment next year. The reduction in the number of infested trees can be contributed to thorough, effective treatment. In addition, biological evaluations in 1960 indicated a static to only slightly increasing tendency. The lower potential of the beetle population did not produce a large buildup ratio. Consequently the number of infested trees originating from the few missed trees represents a marked reduction.

How know?

## DISCUSSION

Throughout most of the lodgepole pine type in the territory covered by Region 4 there has been an explosive increase in mountain pine beetle activity. In many areas, large numbers of trees were attacked in 1960, apparently originating from scattered singles and small groups that usually occur every year in the mature lodgepole stands, but which for the last two years have released abnormally large numbers of beetles. These trees faded and were detected by the fall aerial surveys, and in some cases reported by forest workers. With only a few exceptions ground evaluations show a sharp increase in the number of newly attacked trees over current faders. In a majority of the areas the buildup ratio approaches ten to one.

It is difficult to explain the sudden uptrend of mountain pine beetle activity, however, it is our opinion brood survival over winter and during early spring was much higher than usual.

why ignore condition of the host so persistently?

Statistical analysis of major infestations show at the .05 level no significant difference between 1960 and 1961 fall brood densities. This indicates that the 1961 brood has the capacity of supplying enough adults to cause at least a tenfold increase in the number of trees that will be infested in 1962. There is no way to predict winter survival, therefore, we can only state what potential is present. Early spring examinations will be made to collect data on winter survival of the brood. These will be compared with 1961 spring survival and should provide a basis for more reliable prediction of the trend of each infestation. However, until such data are gathered, plans and expected loss must be judged on the basis of capacity of fall broods.

The question of why numbers of infested trees were reduced in some control areas and not in a majority of the areas should be discussed. The two control units showing marked reduction of number of infested trees were Moon Lake-Brown Duck and the Bear Wallow infestations in the Ashley National Forest. In our 1960 evaluation report, both of these units were classified as having a static trend with low fall brood densities (128 and 168 per square foot respectively). In all other areas treated in 1961 the 1960 prediction was for an increasing trend and fall brood densities were high, over 180 per square foot. If all units were treated with the same care and quality, the expected number of missed trees would be between five to ten percent. As an example, given 100 infested trees each, in static and increasing infestations, five to ten infested trees would be missed. In the static infestation there would be enough brood to attack only between five and ten new trees, but in the increasing infestation, with the ten to one buildup experienced this year, 50 to 100 trees would be attacked. Consequently, the static infestation would show 90 to 95 percent reduction but the increasing infestation would show no reduction to as much as a 50 percent reduction.

The picture is further complicated by the fact the small static infestations were completely covered in one year whereas many of the increasing infestations were too large to treat all of the area in a given year.

This example also points out the necessity of thorough and complete coverage of all areas or units scheduled for treatment. This statement should not be construed to mean large projects cannot be divided into small units scheduled for treatment over several years. This can be done, but location of unit boundaries should consider entomological factors as well as other practical aspects.

Beetles fly
pretty well

A table giving average brood data by units follows this section. Data for three units are starred showing brood data were taken before egg laying was complete. All other units with an increasing trend, except Snider-Taylor Creek, show a fall brood density in excess of 180 per square foot. Data collected over the last four years strongly indicate a fall brood density of 180 per square foot seems to be the breaking point between endemic and epidemic conditions in the lodgepole pine stands of Region 4. In other words it implies brood densities under 180 per square foot rarely give rise to epidemics, but those above 180 have the potential of causing epidemic trends but do not always do so. Much more data are needed to verify or disprove this theory, however, if data continues to support the theory, it will provide the entomologists with a base, or starting point, from which the various biological factors can be assessed. Obviously if on the basis of fall brood data infestations with little chance of developing into epidemics the following year can be separated from those with epidemic potential, the evaluating entomologist can devote his time to determining the trend and intensity of attack for those possessing epidemic potential.

Oh no!

There are 57 separate mountain pine beetle infestations in Region 4. Treatment on all increasing epidemics can be justified entomologically, however, economic and other factors will probably prevent treatment of all epidemic centers next year. Therefore, the evaluating entomologists must determine entomological priorities, and make repeated evaluations so priorities can be adjusted as soon as changes in population capacities occur for each infestation.

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# Mountain Pine Beetle Infestations

| Unit | ave.? DBH | Brood density | Gallery starts | Inches of gallery | Trend |
|---|---|---|---|---|---|
| | | | (per square foot) | | |
| Host: lodgepole pine | | | | | |
| **Payette** | | | | | |
| N. Fk. Payette R. (McCall) | 11.2 | 158.4* | 8.4 | 77.6 | increasing |
| **Sawtooth** | | | | | |
| Big Wood River | | (no fall data recorded) | | | increasing |
| Middle Fk. Warm Spr. Cr. | 12.7 | 276.4 | 9.6 | 81.4 | increasing |
| **Targhee** | | | | | |
| Kilgore-Sheridan | 12.7 | 263.6 | 7.6 | 115.4 | increasing |
| Snider-Taylor Cr. | 11.9 | 172.4 | 5.0 | 81.8 | increasing |
| Dry-Blue Cr. | | (no fall data recorded) | | | increasing |
| Tyler Cr. | 13.6 | 256.0 | 9.6 | 126.8 | increasing |
| Bull Elk-Grouse Cr. | 13.0 | 236.8 | 8.4 | 108.2 | increasing |
| Moody-Carlton Cr. | 15.7 | 268.9 | 8.8 | 117.6 | increasing |
| **Grand Teton National Park** | | | | | |
| Pilgrim Mtn. | 11.8 | 249.2 | 9.6 | 115.0 | increasing |
| Two Ocean Lake - North | 13.0 | 304.0 | 8.0 | 115.8 | increasing |
| Emma Matilda - North | 12.7 | 206.8 | 8.4 | 86.0 | increasing |
| Emma Matilda - South | 15.1 | 249.2 | 7.8 | 95.2 | increasing |
| Pacific Cr. | | (no fall data recorded) | | | increasing |
| Signal Mtn. | | (no fall data recorded) | | | increasing |
| East Signal Mtn. | | (no fall data recorded) | | | increasing |
| Blacktail Butte | 13.2 | 226.8 | 6.8 | 118.2 | increasing |
| Donoho Point | | (no fall data recorded) | | | increasing |
| **Teton** (North Teton) | | | | | |
| Ditch Cr. | 10.6 | 306.0 | 7.8 | 61.0 | increasing |
| Lost Cr. | 14.3 | 315.6 | 11.2 | 75.2 | increasing |
| Pacific Cr. | 11.4 | 200.0 | 7.0 | 80.0 | increasing |
| Rosie's Ridge | 11.4 | 140.0* | 10.2 | 41.8 | increasing |
| Hatchet Matel | 10.0 | 278.0 | 13.2 | 69.6 | increasing |
| Two Ocean Lake - North | 13.0 | 304.0 | 8.0 | 115.8 | increasing |
| **Teton** (South Teton) | | | | | |
| Cache Cr. | 15.8 | 196.0 | 8.4 | 117.8 | increasing |
| Jack Cr. | 14.6 | 271.2 | 7.2 | 99.6 | increasing |

*Egg hatch not complete at time of sample.

Surely not using early instar larvae as surviving brood

| Unit | DBH | Brood density | Gallery starts | Inches of Gallery | Trend |
|---|---|---|---|---|---|
| | | (per square foot) | | | |
| Bridger | 17.6 | 256.0 | 13.0 | 147.8 | increasing |
| Caribou | | | | | |
| Clear Creek | 13.3 | 207.4 | 8.2 | 100.4 | increasing |
| Cache | | | | | |
| Skinner-Co-op Cr. | 12.4 | 262.8 | 9.4 | 108.2 | increasing |
| Copenhagen Basin | 15.1 | 205.6 | 5.0 | 42.8 | increasing |
| Mill Hollow | 13.8 | 275.6 | 6.2 | 109.8 | increasing |
| Cottonwood-Dry Can. | 16.2 | 227.2 | 7.8 | 111.0 | increasing |
| Mud Flat | 15.6 | 322.4 | 9.6 | 115.2 | increasing |
| Wasatch | | | | | |
| North Slope Project | 12.3 | 271.5 | 13.1 | 117.4 | increasing |
| Bear River | 10.7 | 257.6 | 7.0 | 100.7 | increasing |
| Provo River | 12.9 | 267.5 | 9.3 | 106.8 | increasing |
| Weber River | | (no fall data recorded) | | | increasing |
| Ashley | | | | | |
| Manila District | 13.6 | 246.6 | 7.7 | 120.8 | increasing |
| Blanchett Park | | (no fall inspection) | | | unknown |
| Pole Cr. | 12.3 | 99.2 | 6.0 | 70.0 | static |
| An-Kar | | (no fall inspection) | | | unknown |
| Limekiln Springs | | (no fall inspection) | | | unknown |
| Yellowstone - Hell's Can. | | (no fall data recorded) | | | increasing |
| Cow Can. | | (no fall inspection) | | | unknown |
| Oweep | | (no fall data recorded) | | | increasing |
| Moon Lake-Brown Duck | | (no fall data recorded) | | | static to increasing |
| Bear Wallow | | (no fall data recorded) | | | static |
| Miners Gulch | 15.0 | 169.2 | 7.2 | 80.3 | static |
| Host: ponderosa pine | | | | | |
| Payette | | | | | |
| McCall | 8.9 | 78.4 | 6.8 | 70.4 | increasing |

## ENGELMANN SPRUCE BEETLE

### Boise National Forest

On the Landmark District of the Boise National Forest there is a small Engelmann spruce beetle infestation. This infestation covers about 700 acres and contains between 300 to 500 infested trees. The infested trees are in groups and the infestation shows a tendency to move up the drainage. Two trees are now infested for every tree infested last year. Brood figures show an average density of all progeny of 66.5 per square foot of bark area of which 40.5 percent were larval, 49 percent pupae and the remainder young adults. This density is considerably less than most Region 4 Engelmann spruce beetle epidemics. In addition a high incidence of the parasite Medetera sp. was found. Woodpeckers had removed about two-thirds of infested bark on "hibernator trees" and about one-eighth on trees containing larval stage. Other insect parasite and predator activity was also noted. The infestation borders on epidemic and the trend is toward a slight increasing loss next year. However, it is possible the woodpeckers and insect enemies can prevent an increase if favorable conditions prevail this winter.

### Dixie National Forest

The ranger on the Escalante District of the Dixie National Forest reported an Engelmann spruce beetle outbreak in the old Iron Springs Sale on the Griffin top. Biological evaluations confirmed the presence of the outbreak and determined that it was of epidemic status. The infestation is small having only about 500 infested standing trees, stumps and cull logs. However, the infested trees were grouped, brood density was heavy and stand conditions such that rapid buildup of the infestation appeared imminent.

The current sale area in the Griffin top was also examined by the entomologists. Here trap trees were felled last fall. A goodly number of these down trees contained some spruce beetles. All traps were moved to the mill before September 11. Slash was being disposed of currently by piling and burning.

From the bark beetle angle these two areas represent the right and wrong way to log spruce. In the Iron Spring sale, present epidemic area, cutting was by tree selection or by very small groups with no slash disposal. Beetles were able to build up in the slash and windthrown trees. It appeared that a few trees had been toppled or broken by wind every month since the sale was closed.

On the other hand in the present sale area merchantable logs were left as traps over winter and promptly picked up and hauled off the mountain after beetle "fill-in." The cutting was clear cut by block and all slash was to be piled and burned. In this area beetles are not expected to build up and attack standing trees.

## Manti-LaSal National Forest

Aerial surveys of the Monticello District of the Manti-LaSal National Forest detected two areas suspected to be infested with Engelmann spruce beetle. Unfortunately, these areas have not been checked on the ground by the enotomologists and therefore remain as unconfirmed infestations with no information on their severity or possible trend. One area is located on the north side of Jackson Ridge. It covers about 200 acres and contains two groups of "faders" totaling about 500 trees. The other area is in North Canyon in the vicinity of Cooley Pass. About 100 "faders" were counted on about 50 acres. Jackson Ridge and North Canyon areas are about five miles apart and are ten to twelve air miles west of Monticello, Utah.

## Bridger National Forest

Since 1955 a combination of control measures consisting of logging, trap trees and toxic chemicals has been directed against the highly persistent infestation of Engelmann spruce beetle in the upper Green River area. In 1961 an all-out attack was launched against this infestation with the intent of reducing it in two years to a tolerable level.

Biological evaluations of the Green River infestations and adjacent spruce areas determined the following facts: In the project area beetle population, although reduced in number, still maintains epidemic tendencies. Both one and two year generation strain of the beetle are present, but it now appears a majority of the population is of the one year strain. Since attack flights occur each year, there is a need for successive years of concentrated treatment. Woodpeckers are becoming abundant in the area. Entomologists considered the woodpecker population sufficient to handle the infestations in the upper bole of the trees; consequently, chemical treatment was limited to the basal 15 feet in 1961. Within this epidemic infestation are several centers where *Medetera sp.* populations are exerting noticeable control. Some of these *Medetera* centers have been active for three to four years, but have not increased notably in size nor have the *Medetera* populations increased in number for the last couple of years. The *Medetera* centers do not exceed 1/2 acre and some are less than 1/5 acre in size. Careful observation of these parasite centers should be maintained to determine their usefulness in the control of this infestation.

Pot Creek, south of the main infestation, and Roaring Fork to the northeast were examined and only a few trees infested in 1961 were found in each area. Both areas should be watched closely because of their close proximity to the main infestation.

# DISCUSSION

The Intermountain region now has one large and two small infestations of Engelmann spruce beetle. In addition there are two areas near Monticello, Utah, suspected of having Engelmann spruce beetle activity.

The Dixie National Forest infestation was scheduled for treatment, consisting of logging and chemical treatment, this fall. Efforts are being made to handle the Sand Creek infestations on the Boise National Forest by logging. Continuation of the all-out attack against the Green River infestation is planned for next year. Early examinations of the Monticello areas will determine what , if any, action will be necessary.

The Dixie National Forest infestations originated in an area selectively logged several years ago. The marking guide for Region 4 now states, whenever possible spruce will be clear cut and consideration must be given to minimizing blowdown along cutting boundaries. In addition, regular inspections for beetle activity of spruce sales are required for four years after termination of logging.

The required inspection of spruce sales proved its value by early detection of the Dixie infestation. The new cutting policy should minimize the number of infestations that develop in sales and will provide prompt detection of any buildup.

## Engelmann Spruce Beetle Infestations

| Unit | DBH | Brood density | Gallery starts | Inches of Gallery | Trend |
|---|---|---|---|---|---|
| | | (per square foot) | | | |
| Boise National Forest | | | | | |
| Sand Creek | 19.0 | 66.5 | 2.5 | 26.2 | gradual increase |
| Bridger National Forest | | | | | |
| Moose Creek | 23.8 | 393.2 | 8.8 | 92.6 | increasing |
| Manti-LaSal National Forest | | | | | |
| Monticello | | (no ground checks made) | | | |
| Dixie National Forest | | | | | |
| Iron Springs | 24.5 | 208.60 | 3.6 | 37.9 | increasing |

## DOUGLAS-FIR BEETLE

Annually, large volumes of Douglas-fir in Forest Service Region 4 are being killed by the Douglas-fir bark beetle. This year as has been the case for several years, the Sawtooth and Dixie National Forests are particularly hard hit with many large epidemic centers present on both forests. Of the forests with stands of Douglas-fir, only the Wasatch and Ashley National Forests are relatively free of Douglas-fir beetle activity.

This year Douglas-fir beetle epidemic centers were accurately mapped on several forests by the aerial survey entomologists. The purpose was to supply information that would assist in directing sale activity into bark beetle centers. In addition the entomologist, joined by local forest officers, inspected several Douglas-fir beetle areas to determine need and feasibility of logging the infested centers.

## FIR ENGRAVER BEETLES

Many thousand true firs are killed annually throughout the Intermountain region. A number of factors are involved in this mortality. The majority of true firs are killed by the fir engraver, *Scolytus ventralis* Lec., or *Dryocoetes confusus* Sw. Ground examination is required to determine the causal agent involved since it is not possible to separate causes of mortality from the air. The majority of the affected trees occur in rather inaccessible areas and are of relatively low economic value. Due to these facts and the large number of more pressing epidemics in need of evaluation, only infestations in those areas showing immediate high value, such as national parks, were visited this year.

# KEY TO BARK BEETLE INFESTATIONS

## Mountain Pine Beetle

Payette National Forest
1. North Fork Payette River and Lake Fork Creek

Sawtooth National Forest
2. Big Wood River and Middle Fork Warm Springs Creek

Targhee National Forest
3. Kilgore - Island Park Idaho
4. Bull Elk-Grouse Creek
5. Moody-Carlton Creek

Grand Teton National Park
6. All infestations

Teton National Forest
7. North Teton
8. South Teton

Bridger National Forest
9. Green River Lakes

Caribou National Forest
10. Diamond Flats and Clear Creek

Cache National Forest
11. All infestations

Wasatch National Forest
12. North Slope Project
13. Provo-Weber Rivers

Ashley
14. Manila District
15. South Ashley

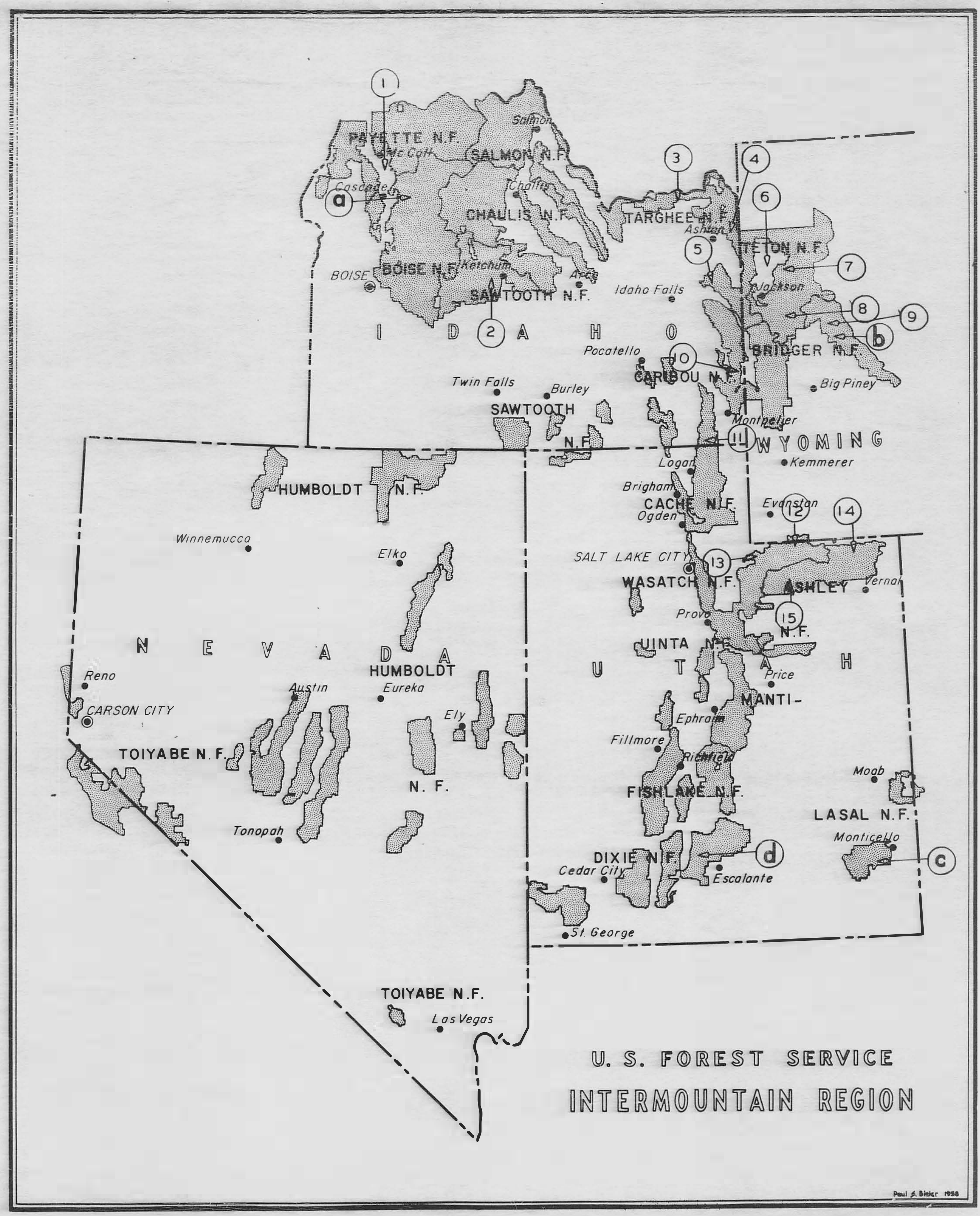
## Engelmann Spruce Beetle

Boise National Forest
A. Sand Creek

Bridger National Forest
B. Green River Project

Manti-LaSal National Forest
C. Monticello

Dixie National Forest
D. Griffin top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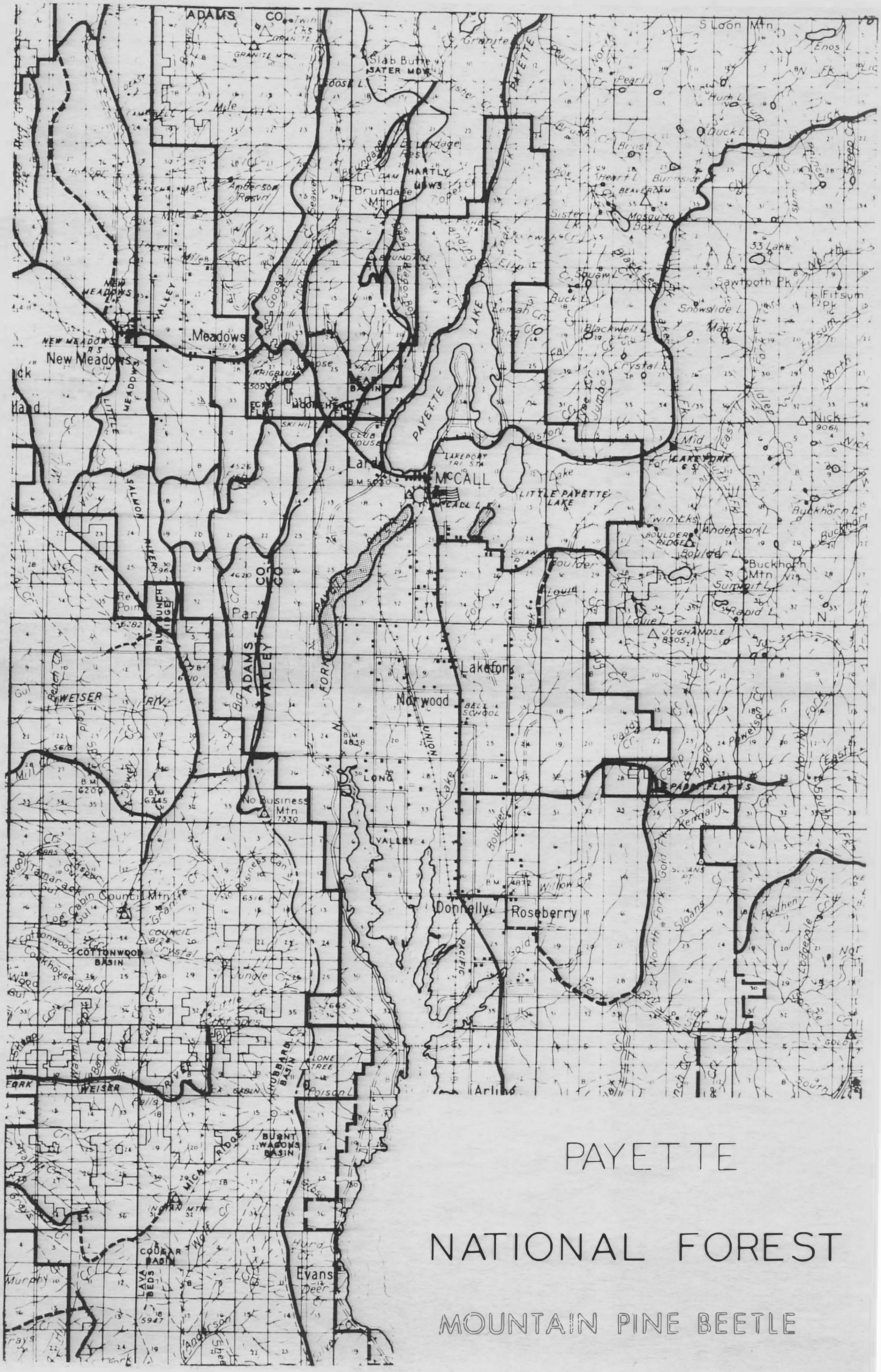
McCall
SALMON N.F.
Salmon
Cascade
Challis
CHALLIS N.F.
TARGHEE N.F.
Ashton
TETON N.F.
BOISE
BOISE N.F.
Ketchum
Arco
SAWTOOTH N.F.
Idaho Falls
Jackson
I D A H O
BRIDGER N.F.
Pocatello
CARIBOU N.F.
Twin Falls
Burley
Big Piney
SAWTOOTH
N.F.
Montpelier
WYOMING
Kemmerer
Logan
Brigham
CACHE N.F.
Ogden
Evanston
HUMBOLDT N.F.
Winnemucca
Elko
SALT LAKE CITY
WASATCH N.F.
ASHLEY
N.F.
Vernal
Provo
N E V A D A
HUMBOLDT
UINTA N.F.
U T A H
Reno
Austin
Eureka
Price
CARSON CITY
Ely
MANTI-
Ephraim
TOIYABE N.F.
Fillmore
Richfield
N. F.
Moab
FISHLAKE N.F.
LASAL N.F.
Tonopah
Monticello
DIXIE N.F.
Cedar City
Escalante
St. George
TOIYABE N.F.
Las Vegas
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
a
b
c
d

# U. S. FOREST SERVICE

# INTERMOUNTAIN REGION

Paul S. Bieler 1958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New Meadows
Meadows
McCALL
PAYETTE LAKE
LITTLE PAYETTE LAKE
Lakefork
Norwood
Donnelly
Roseberry
Council Mtn
No Business Mtn
Brundage Mtn
Evans
WEISER RIV
ADAMS VALLEY

PAYETTE

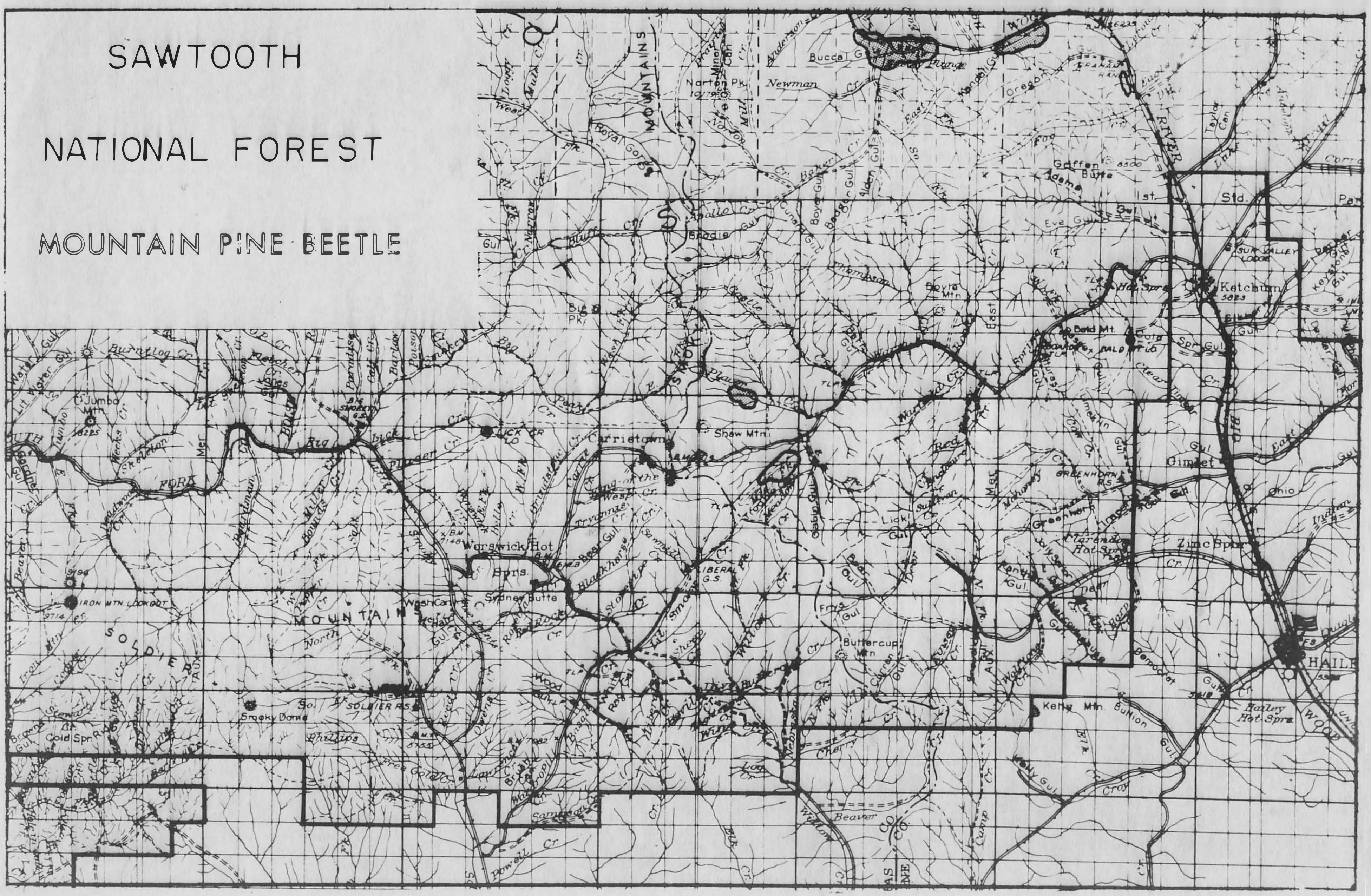
NATIONAL FOREST

MOUNTAIN PINE BEETLE

# SAWTOOTH

# NATIONAL FOREST

# MOUNTAIN PINE BEETLE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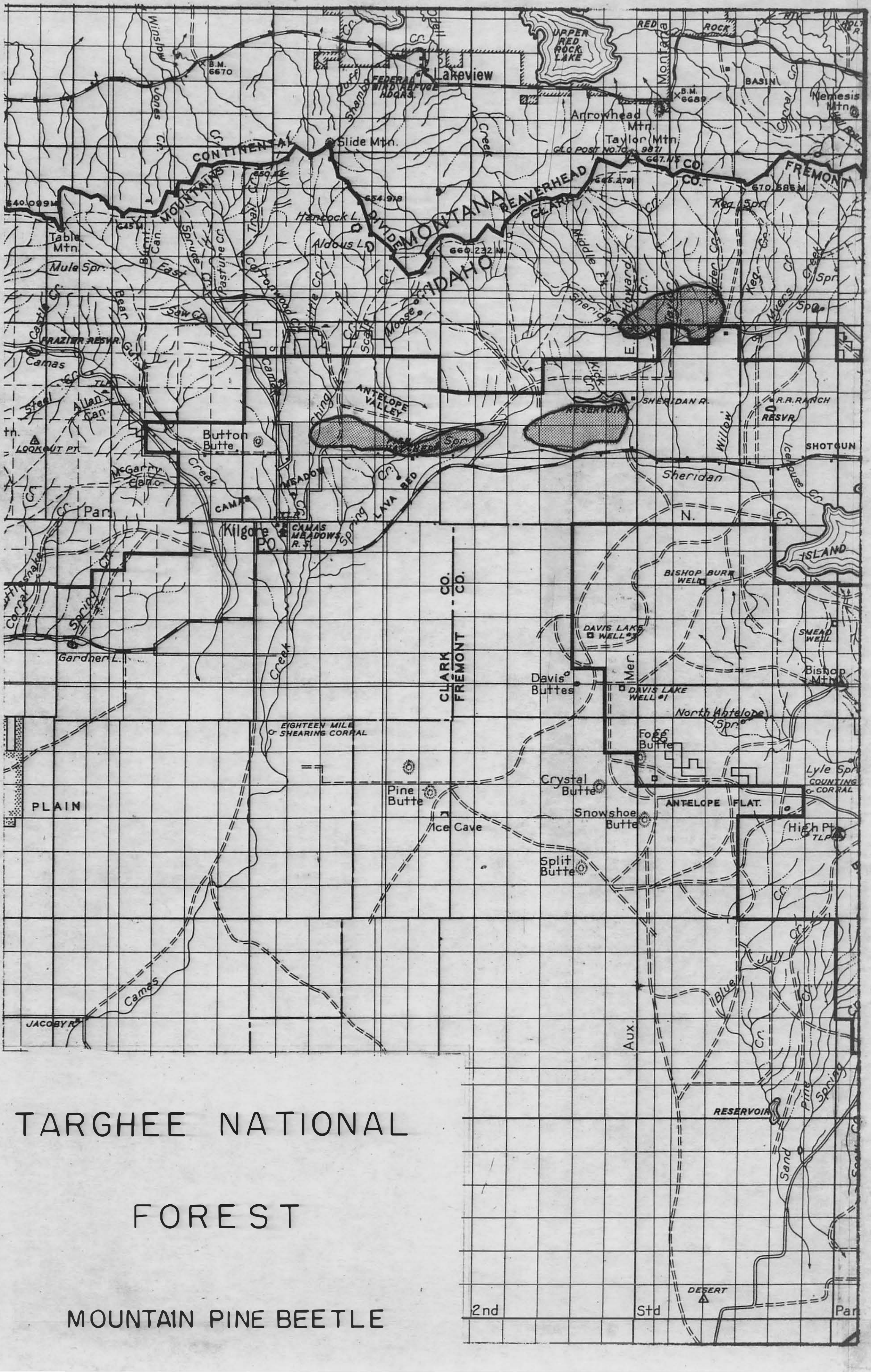
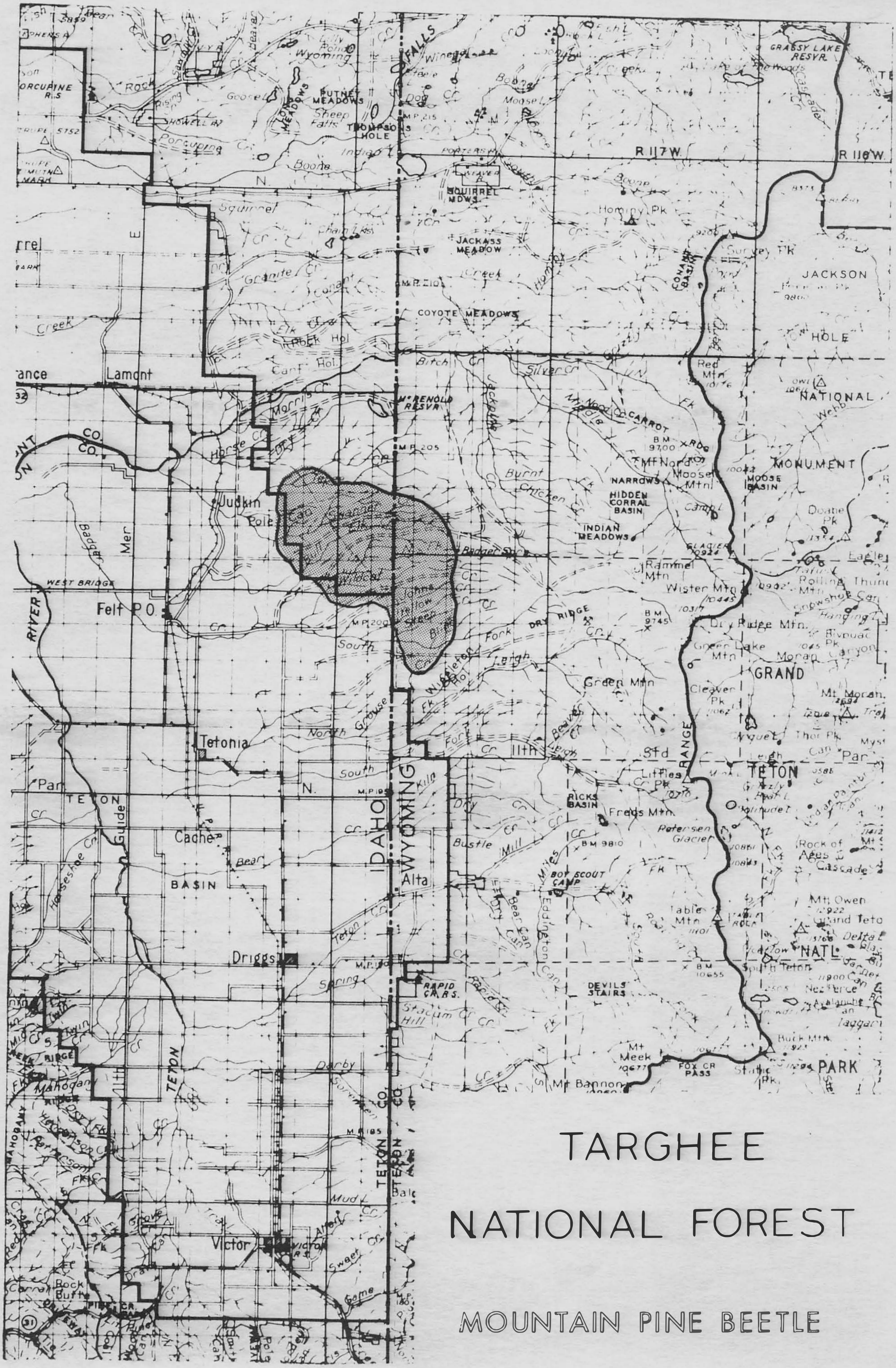
Sun Valley Lodge
Gimlet
Zinc Spr
Hailey
Hailey Hot Spr
Greenhorn R.S.
Clarendon Hot Spr
Bald Mt.
Boyle Mtn
Griffen Butte 6300
Norton Pk 10179
Newman
Bucca
Big Peak
Carrietown
Shaw Mtn
Liberal G.S.
Buttercup Mtn
Kelly Mtn
Bullion
Worswick Hot Sprs.
Sydney Butte
Soldier R.S.
Smoky Dome
Soldier
Mountains
Iron Mtn. Lookout 9714
Jumbo Mtn 9225
Big Smoky G.S.
Lick Cr L.O.
Burntlog Cr.
Skeleton
Big Smoky
South Fork
Beaver
Powell Cr.
Cold Spr
Phillips
Deer
Democrat
Croy
Camas Co.
Elmore Co.
Blaine Co.
Wood River
Big Wood River
Eve Gul
Apollo Cr
Brodie
Mountains
Royal Gorge
Mill Cr
Bluff Cr
East Fk
Oregon Gul
Adams Gul
Placer
Greenhorn
Dry
Willow Cr
Beaver
Log Cr
Cherry
Warm Spr
Wash Can
Carrie
Blackhorse
Bear Gul
Trinity
Paradise
Bowlder
Weeks
Jones
Fletcher
Lit Skeleton
Mountains
Hyndman
Keystone Gul
Indian
Ohio
Eagle


UPPER RED ROCK LAKE
RED ROCK
Lakeview
FEDERAL BIRD REFUGE HDQRS.
B.M. 6670
B.M. 6689
BASIN
Nemesis Mtn.
Arrowhead Mtn.
Taylor Mtn.
Slide Mtn.
CONTINENTAL DIVIDE
MOUNTAINS
MONTANA
IDAHO
BEAVERHEAD CO.
FREMONT CO.
CLARK
Table Mtn.
Mule Spr.
Hancock L.
Aldous L.
Sheridan
Middle Fk.
Howard Cr.
Kick Cr.
Keg Spr.
Myers Creek
FRAZIER RESVR.
Camas
Castle Cr.
Bear Gulch
Steel Cr.
Allan Can.
LOOKOUT PT.
Button Butte
ANTELOPE VALLEY
SHERIDAN R.
RESERVOIR
R.R. RANCH
RESVR.
SHOTGUN
Willow
Icehouse Cr.
McGarry Cabin
Park
CAMAS MEADOW
Kilgore P.O.
CAMAS MEADOWS R.S.
Spring Cr.
LAVA BED
Sheridan
N.
ISLAND
BISHOP BURR WELL
DAVIS LAKE WELL #2
SMEAD WELL
Bishop Mtn.
Davis Buttes
DAVIS LAKE WELL #1
North Antelope Spr.
Fogg Butte
Lyle Spr.
COUNTING CORRAL
Crystal Butte
ANTELOPE FLAT.
Snowshoe Butte
High Pt. TLP
Split Butte
Pine Butte
Ice Cave
EIGHTEEN MILE SHEARING CORRAL
CLARK CO.
FREMONT CO.
Gardner L.
Rattlesnake
Corral
Spring Cr.
Creek
PLAIN
Camas
JACOBY R.
Aux. Mer.
Blue Cr.
July Cr.
RESERVOIR
Sand
Pine Spring
DESERT
2nd Std Par

# TARGHEE NATIONAL FOREST

## MOUNTAIN PINE BEETLE

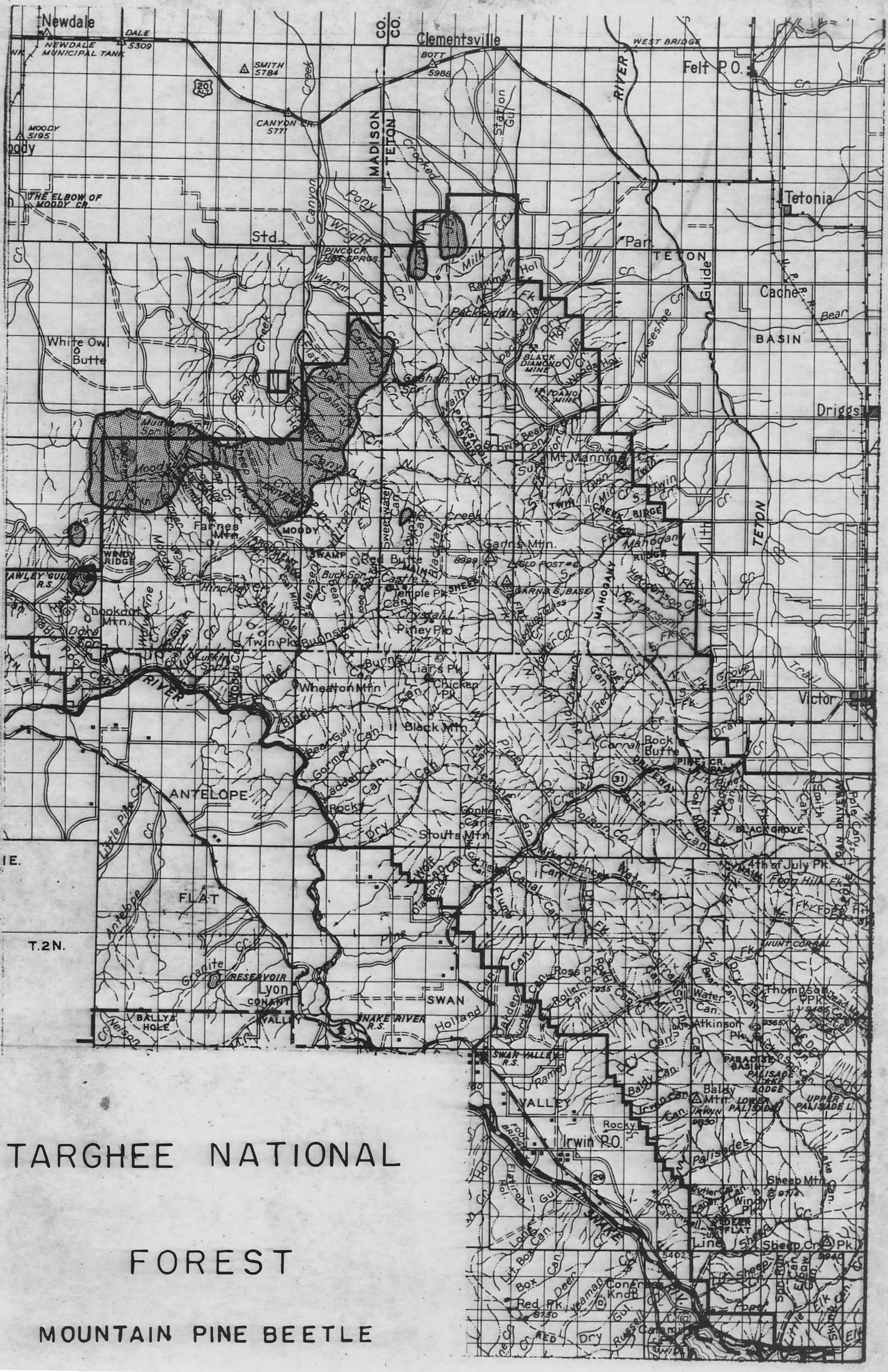


Lamont
Judkin
Felt P.O.
Tetonia
Cache
BASIN
Driggs
Victor
Alta
IDAHO
WYOMING
TETON CO.
JACKSON HOLE
NATIONAL MONUMENT
GRAND TETON NATL PARK
R 117 W.
R 116 W.

TARGHEE

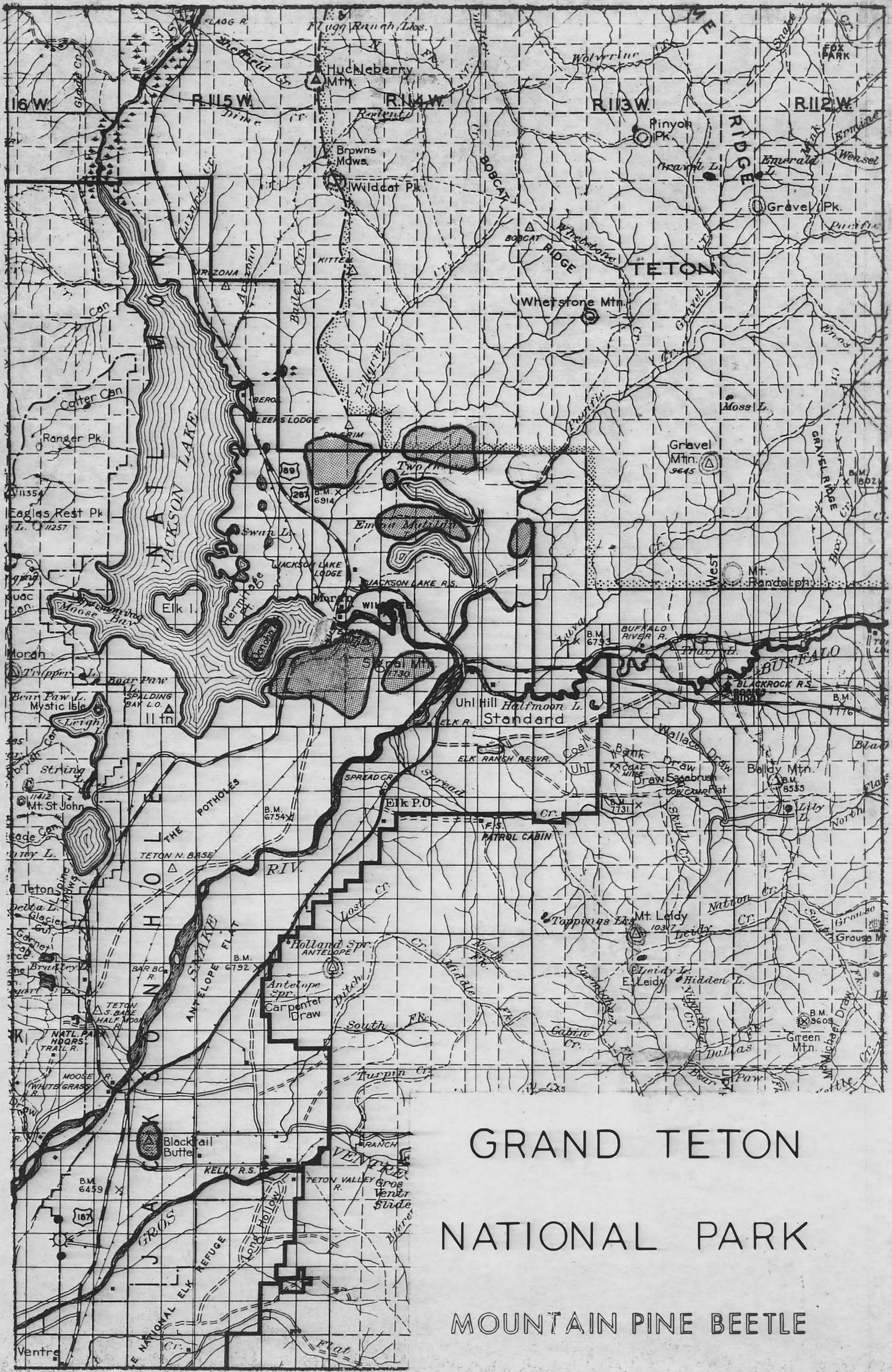
NATIONAL FOREST

MOUNTAIN PINE BEETLE



# TARGHEE NATIONAL FOREST

## MOUNTAIN PINE BEETLE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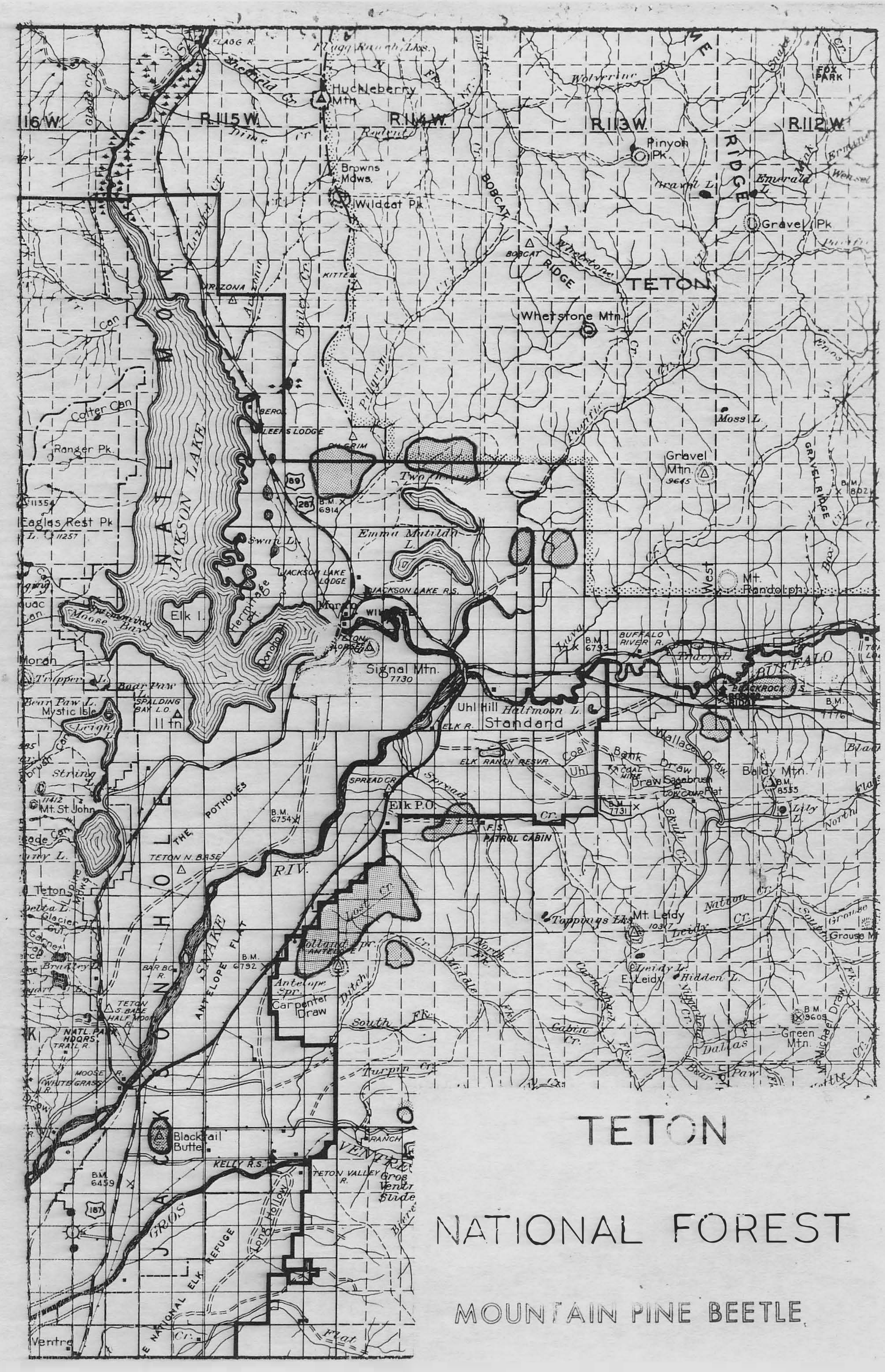
R.115 W.
R.114 W.
R.113 W.
R.112 W.
Flagg R.
Flagg Ranch
Huckleberry Mtn.
Browns Mdws.
Wildcat Pk.
Pinyon Pk.
Gravel L.
Emerald L.
Gravel Pk.
Wolverine Cr.
Fox Park
Ridge
Bobcat
Bobcat Ridge
Whetstone Cr.
Teton
Whetstone Mtn.
Arizona
Kittee
Pilgrim Cr.
Pilgrim
Colter Can
Ranger Pk.
Eagles Rest Pk
Jackson Lake
Leeks Lodge
Swan L.
Jackson Lake Lodge
Jackson Lake R.S.
Moran
Elk I.
Moose Bay
Hermitage Pt.
Signal Mt.
Moss L.
Gravel Mtn.
9645
Gravel Ridge
Mt. Randolph
Two Ocean
Emma Matilda
Buffalo River R.
B.M. 6733
Buffalo
Blackrock R.S.
Trapper L.
Bear Paw L.
Spalding Bay L.O.
Mystic Isle
Leigh L.
Uhl Hill
Halfmoon L.
Standard
Elk Ranch Resvr.
Coal
Bank
Wallace Draw
Uhl
Coal Mine Draw
Sagebrush Flat
Baldy Mtn.
B.M. 8555
Lily L.
String L.
Mt. St John
Spread Cr.
Elk P.O.
F.S. Patrol Cabin
The Potholes
B.M. 6754
Teton N. Base
Riv.
Skull Cr.
Mt. Leidy
10317
Leidy Cr.
Tappings Lk.
Leidy L.
Hidden L.
Holland Spr.
Antelope
B.M. 6792
Snake
Antelope Flat
Antelope Spr.
Carpenter Draw
Ditch
South Fk.
Cabin Cr.
Green Mtn.
B.M. 9609
Dallas
Teton S. Base
Halfmoon
Natl. Park Hdqrs.
Moose R.
White Grass R.
Turpin Cr.
Jackson Hole
Blacktail Butte
Kelly R.S.
Teton Valley R.
Gros Ventre Slide
B.M. 6439
187
Gros
National Elk Refuge
Long Hollow
Ventre
Flat
89
287

# GRAND TETON

# NATIONAL PARK

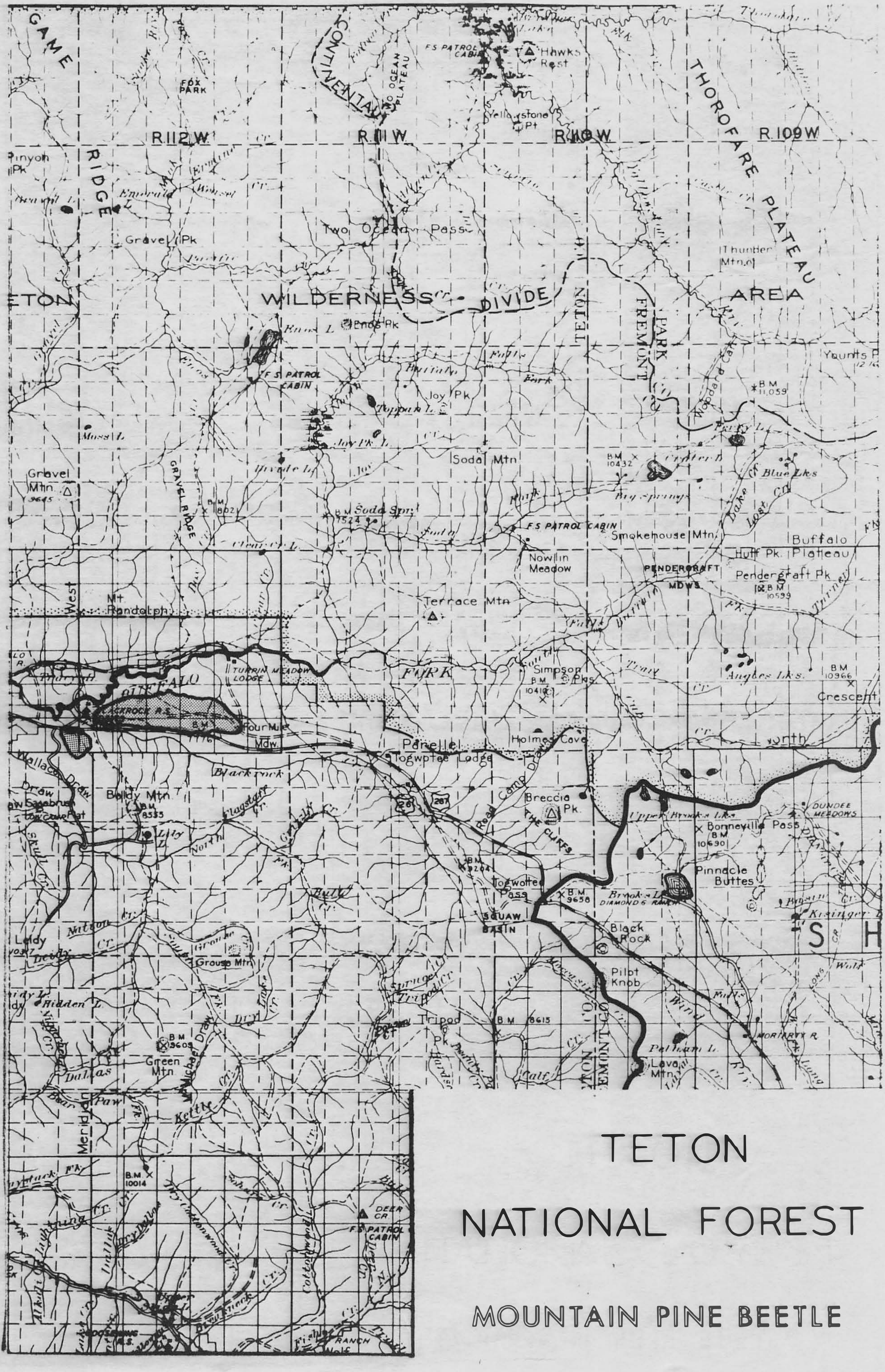
## MOUNTAIN PINE BEETLE


R.116W.
R.115W.
R.114W.
R.113W.
R.112W.
Flagg Ranch Lks.
FLAGG R.
Huckleberry Mtn.
Sheffield Cr.
Wolverine
FOX PARK
Pinyon Pk.
Gravel L.
Emerald L.
RIDGE
Gravel Pk.
Browns Mdws.
Wildcat Pk.
BOBCAT
BOBCAT RIDGE
Whetstone
TETON
Whetstone Mtn.
ARIZONA
KITTEN
Bailey Cr.
Pilgrim
Can
Colter Can.
Ranger Pk.
11354
Eagles Rest Pk.
11257
JACKSON LAKE
LEEKS LODGE
PILGRIM
89
287
B.M. 6914
Two Ocean
Emma Matilda L.
Moss L.
Gravel Mtn.
9645
GRAVEL RIDGE
B.M. 8027
Swan L.
JACKSON LAKE LODGE
JACKSON LAKE R.S.
Elk I.
Moose Bay
Moran
Signal Mtn.
7730
Mt. Randolph
West
Lava
B.M. 6793
BUFFALO RIVER R.
BUFFALO
BLACKROCK
B.M. 7776
Trapper L.
Bear Paw L.
Mystic Isle
SPALDING BAY L.O.
Leigh L.
Uhl Hill
Halfmoon L.
Standard
ELK R.
String L.
ELK RANCH RESVR.
Coal
Bank
Draw
Uhl
COAL MINE
Wallace Draw
Baldy Mtn.
B.M. 8535
Sagebrush Flat
LOW CAMP
7731
Mt. St. John
11412
THE POTHOLES
B.M. 6754
SPREAD CR.
Elk P.O.
Spread Cr.
F.S. PATROL CABIN
TETON N. BASE
RIV.
Lily L.
North
Teton
Delta L.
Glacier Gul.
Lost Cr.
Toppings Lks.
Mt. Leidy
10317
Leidy Cr.
Nation Cr.
Grouse Mt.
ANTELOPE FLAT
SNAKE
JACKSON HOLE NATL MON.
B.M. 6792
Antelope Spr.
Carpenter Draw
Ditch
Middle Fk.
North Fk.
Leidy L.
E. Leidy
Hidden L.
Cabin Cr.
Dallas Fk.
B.M. 9609
Green Mtn.
TETON S. BASE
HALF MOON R.
NATL PARK HDQRS.
TRAIL R.
South Fk.
Turpin Cr.
MOOSE R.
WHITE GRASS
Bear Paw
Blacktail Butte
RANCH
VENTRE
B.M. 6459
KELLY R.S.
TETON VALLEY R.
Gros Ventre Slide
187
GROS
Long Hollow
NATIONAL ELK REFUGE
Ventre
Flat
Cr.

# TETON

# NATIONAL FOREST

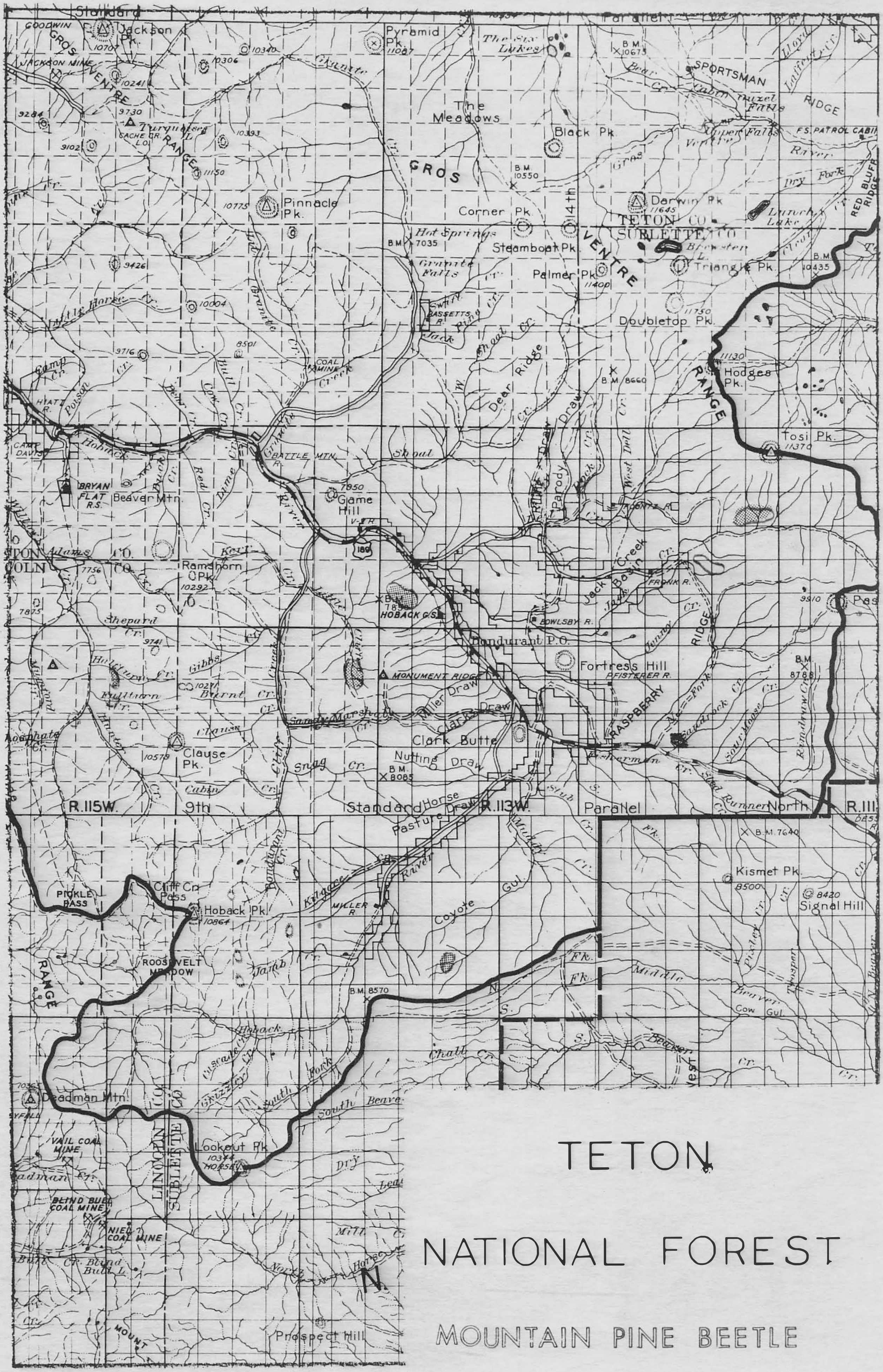
## MOUNTAIN PINE BEETLE


GAME RIDGE
FOX PARK
CONTINENTAL
TWO OCEAN PLATEAU
F.S. PATROL CABIN
Hawks Rest
Yellowstone Pt
THOROFARE PLATEAU AREA
R112W
R111W
R110W
R109W
Pinyon Pk
Emerald L.
Gravel Pk
Two Ocean Pass
Thunder Mtn.
TETON
WILDERNESS
DIVIDE
TETON
FREMONT
PARK
Enos L.
Enos Pk
F.S. PATROL CABIN
Joy Pk.
Toppan L.
Younts Pk
B.M. 11,059
Moss L.
Gravel Mtn. 9645
GRAVEL RIDGE
B.M. 8621
B.M. 7524
Soda Spr.
Soda Mtn
B.M. 10432
Crater L.
Blue Lks
Big Springs
F.S. PATROL CABIN
Smokehouse Mtn.
Buffalo Plateau
Huff Pk.
Nowlin Meadow
PENDERGRAFT MDWS
Pendergraft Pk
B.M. 10599
West
Mt Randolph
Terrace Mtn
TURPIN MEADOW LODGE
BUFFALO
FORK
Simpson Pks
B.M. 10416
Angles Lks.
B.M. 10966
Crescent
B.M. 7776
Four Mile Mdw
Parallel
Togwotee Lodge
Holmes Cave
Wallace Draw
Blackrock
Baldy Mtn
B.M. 8555
Sagebrush
Lily L.
Flagstaff Cr.
North
26
287
Breccia Pk.
THE CLIFFS
Road Camp Draw
Upper Brooks Lks
Bonneville Pass
B.M. 10690
DUNDEE MEADOWS
Pinnacle Buttes
B.M. 9264
Togwotee Pass
SQUAW BASIN
B.M. 9658
Brooks L.
DIAMOND G RANCH
Black Rock
Leidy
Grouse Mtn
Pilot Knob
Hidden L.
Tripod Pk
B.M. 8615
B.M. 9603
Green Mtn
Dallas
Bear Paw
Kettle
Pelican L.
Lava Mtn.
MORIARTY R.
Meridian
B.M. 10014
DEER CR
F.S. PATROL CABIN
Cottonwood
RANCH

# TETON

# NATIONAL FOREST

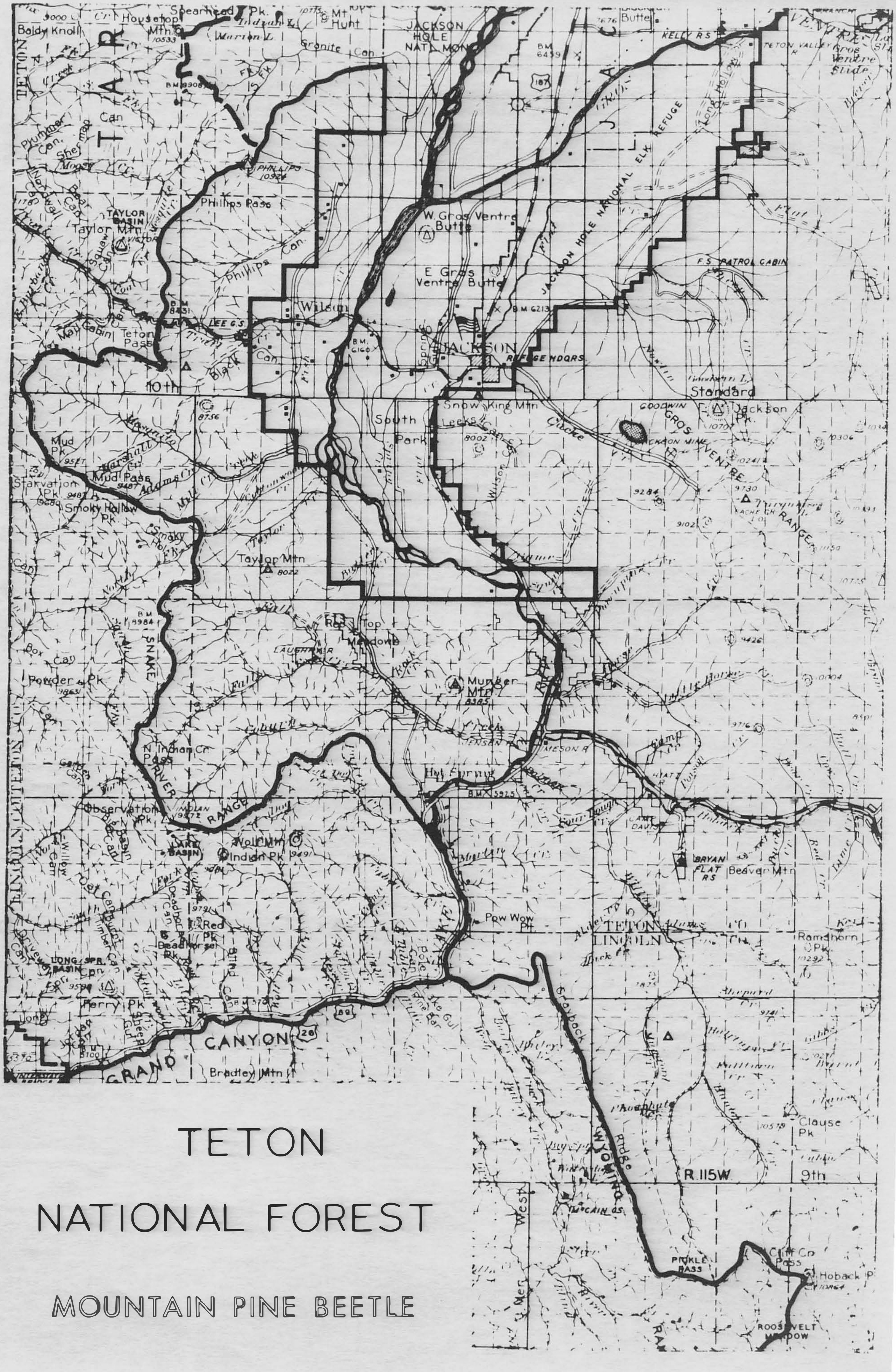
## MOUNTAIN PINE BEETLE


Standard
Parallel
GOODWIN
Jackson Pk.
10707
JACKSON MINE
GROS VENTRE RANGE
Pyramid Pk.
11067
The Six Lakes
B.M. 10675
SPORTSMAN RIDGE
Bear Cr.
Cabin
Upper Falls
F.S. PATROL CABIN
Granite Cr.
The Meadows
Black Pk.
Turquoise L.
CACHE CR. L.O.
Pinnacle Pk.
10775
GROS VENTRE RANGE
B.M. 10550
Corner Pk.
14th
Darwin Pk.
11645
TETON CO.
SUBLETTE CO.
Brewster L.
Triangle Pk.
B.M. 10435
Hot Springs
B.M. 7035
Steamboat Pk.
Palmer Pk.
11400
Granite Falls
Lunch Lake
RED BLUFF RIDGE
Dry Fork
River
BASSETTS R.
Shoal Cr.
Jack Pine Cr.
Doubletop Pk.
11750
Little Horse Cr.
11130
Hodges Pk.
B.M. 8660
Dear Ridge
Draw
Camp Cr.
Poison Cr.
HYATT R.
COAL MINE
Creek
Bull Cr.
Cow Cr.
Hoback
CAMP DAVIS
BATTLE MTN R.
Shoal
Tosi Pk.
11370
BRYAN FLAT R.S.
Beaver Mtn.
Red Cr.
Dime Cr.
Game Hill
7950
V-S R.
Parody
Rock Cr.
West Dell Cr.
KOONTZ R.
Adams
TETON CO.
LINCOLN CO.
7756
Ramshorn Pk.
10292
Kerr
189
Jack Basin Creek
FRANK R.
B.M. 7850
HOBACK G.S.
DOWLSBY R.
Bondurant P.O.
RIDGE
9910
Pass
Shepard Cr.
Gibbs
Fortress Hill
PFISTERER R.
B.M. 8786
MONUMENT RIDGE
Miller Draw
Burnt Cr.
Clark Draw
RASPBERRY
Sandrock Cr.
Clark Butte
Clause Pk.
10579
Nutting Draw
B.M. 8085
Snag Cr.
Cabin
Fisherman
Sled Runner
R.115W.
9th
Standard
Horse Pasture Draw
R.113W.
Parallel
North
R.111
B.M. 7640
Kismet Pk.
8500
8420
Signal Hill
PICKLE PASS
Cliff Cr. Pass
Hoback Pk.
10864
Kilgore
MILLER R.
River
Coyote Gul.
RANGE
ROOSEVELT MEADOW
B.M. 8570
Middle
Beaver
Cow Gul.
Fk.
Hoback
Cascade Cr.
Grizzly Cr.
South Fork
Chall Cr.
Beaver
West
Deadman Mtn.
LINCOLN CO.
SUBLETTE CO.
South Beaver
VAIL COAL MINE
Lookout Pk.
10344
Dry
Deadman Cr.
BLIND BULL COAL MINE
NIEL COAL MINE
Blind Bull L.
Mill
North
Horse
Mount
Prospect Hill

# TETON

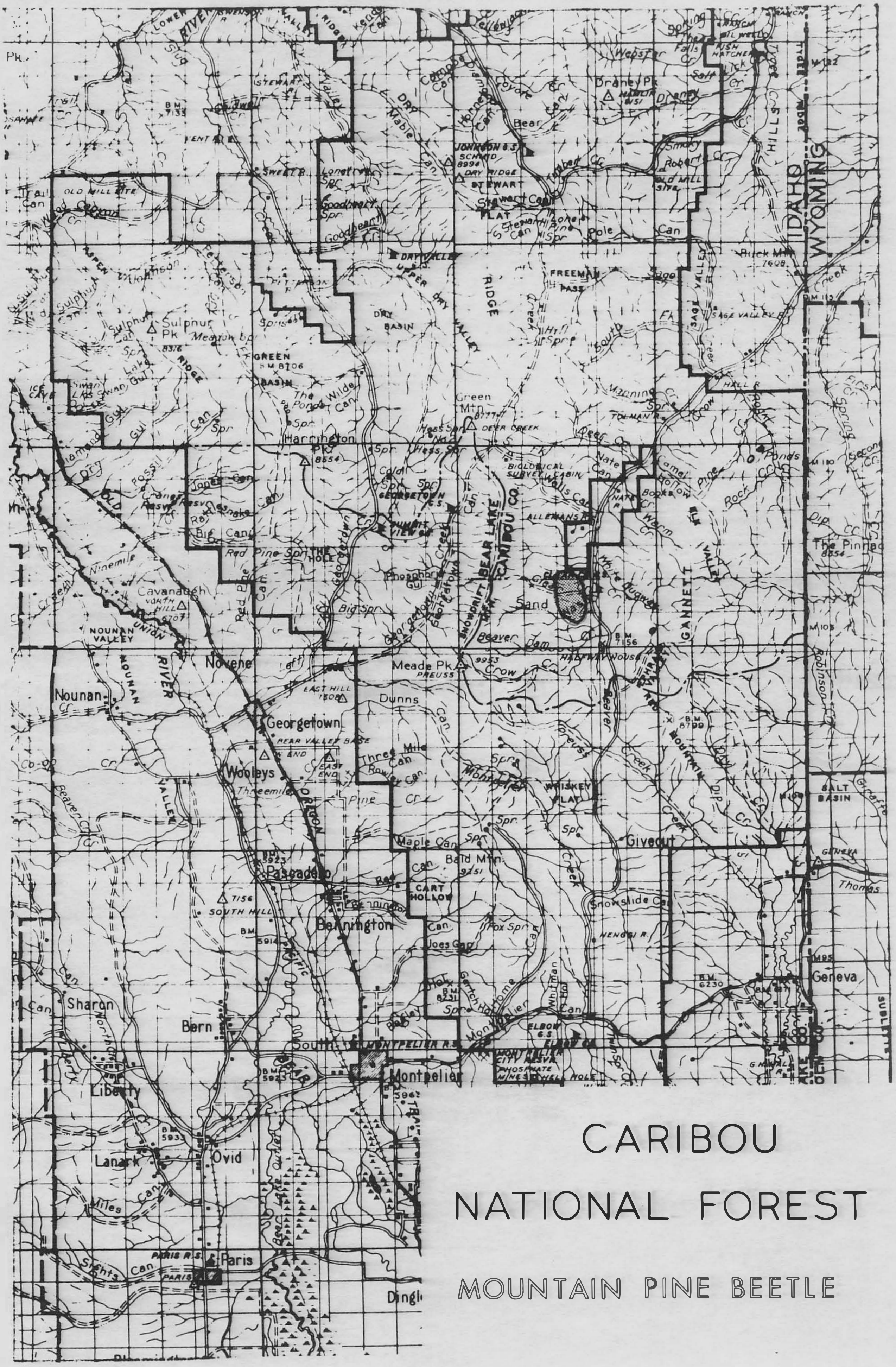
# NATIONAL FOREST

## MOUNTAIN PINE BEETLE


Spearhead Pk.
Mt Hunt
Houstop Mtn. 10533
Baldy Knoll
Marion L.
Granite Can.
JACKSON HOLE NAT'L MON.
Blacktail Butte
KELLY R.S.
TETON VALLEY R
Gros Ventre Slide
TARGHEE
187
Phillips Pass
PHILLIPS 10924
TAYLOR BASIN
Taylor Mtn
Phillips Can.
W. Gros Ventre Butte
E Gros Ventre Butte
JACKSON HOLE NATIONAL ELK REFUGE
F.S. PATROL CABIN
Wilson
LEE G.S.
Mail Cabin
Teton Pass
10th
JACKSON
REFUGE HDQRS
Snow King Mtn
South Park
Standard
GOODWIN L.
Jackson Pk. 10707
GROS VENTRE RANGE
Mud Pk.
Mud Pass 9487
Starvation Pk.
Smoky Hollow Pk.
Taylor Mtn 8022
Red Top Meadows
Munger Mtn 8385
Box Can
Powder Pk 9863
SNAKE RIVER RANGE
N. Indian Cr. Pass
Observation Pk
LAKE BASIN
Wolf Mtn
Indian Pk 9491
Hot Springs
CAMP DAVIS
BRYAN FLAT RS
Beaver Mtn
Pow Wow Pt
TETON
LINCOLN
Ramshorn Pk. 10292
Red Pk
Deadhorse Pk
LONG SPR. BASIN
Perry Pk
GRAND CANYON
Bradley Mtn
89
26
Greyback Ridge
WYOMING RANGE
R. 115W.
9th
Clause Pk
McCAIN G.S.
PICKLE PASS
Cliff Cr Pass
Hoback Pk
ROOSEVELT MEADOW
LINCOLN CO. TETON CO.

# TETON NATIONAL FOREST

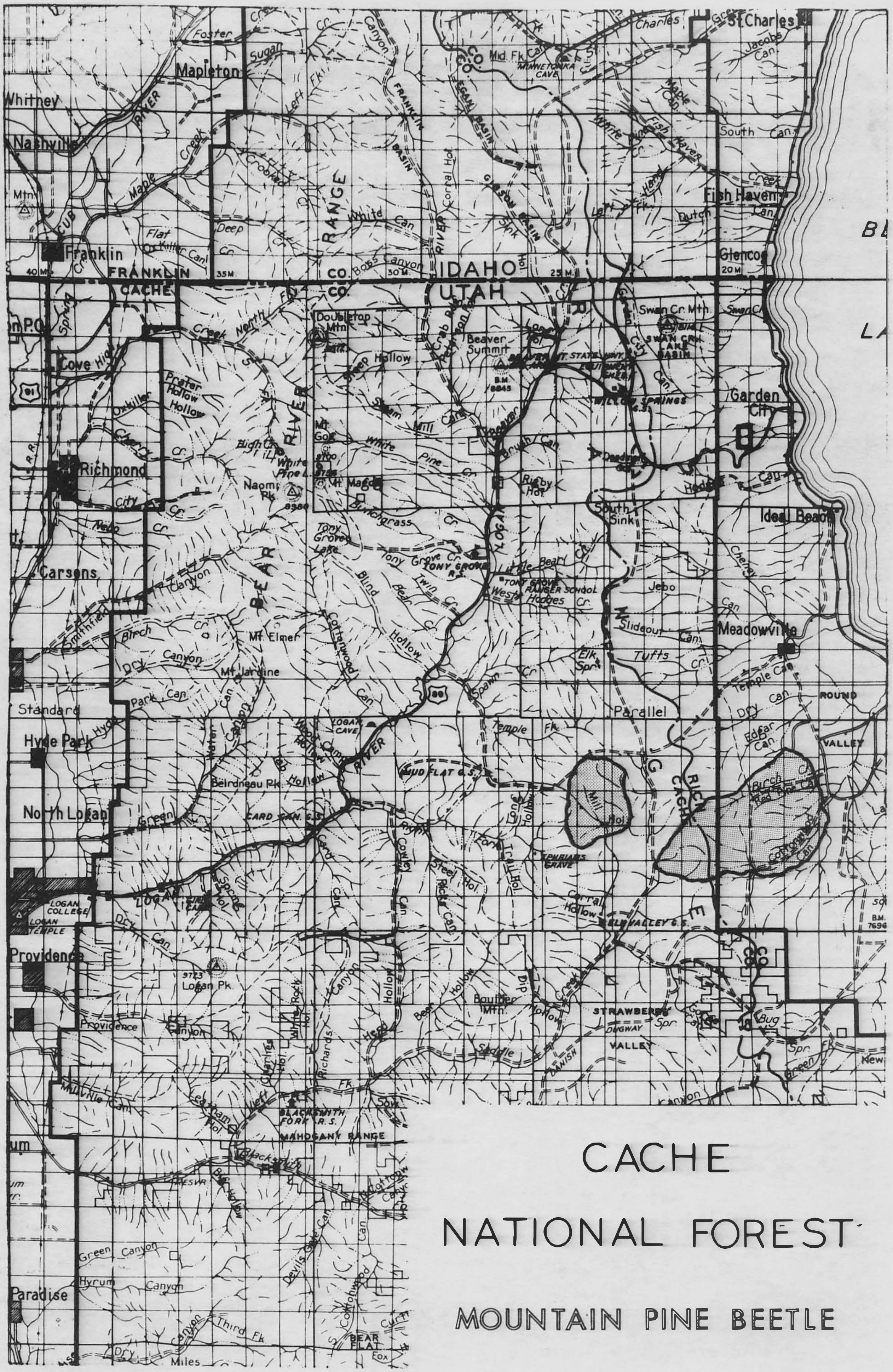
## MOUNTAIN PINE BEETLE


IDAHO
WYOMING
Drney Pk
Stewart Flat
Buck Mtn 7608
Freeman Pass
Dry Ridge
Upper Dry Valley
Dry Basin
Green Basin
Sulphur Pk 8316
Sulphur Ridge
Ice Cave
Harrington Pk 8554
Green Mtn
Georgetown G.S.
Summit View
Bear Lake Caribou Co
Sand
Beaver Dam
Halfway House
Gannett
Sage Valley
Crow Cr
Camel Hollow
The Pinnacle 8854
Cavanaugh
Nounan Valley
Union
Bear River
Nounan
Nounan Valley
Georgetown
Novene
Meade Pk 9953
Preuss
Dunns Can
East Hill
Wooleys
Three Mile Can
Whiskey Flat
Givecut
Salt Basin
Geneva
Maple Can
Bald Mtn 9251
Cart Hollow
Pescadero
Pennington
South Hill
Montpelier Can
Elbow G.S.
Montpelier R.S.
Montpelier City Resvr
Phosphate Mines
Montpelier
Snowslide Can
Hengsi R.
Sharon
Bern
Liberty
Ovid
Lanark
Paris R.S.
Paris
Dingle
Sub Lake
Sublette

# CARIBOU

# NATIONAL FOREST

## MOUNTAIN PINE BEETLE



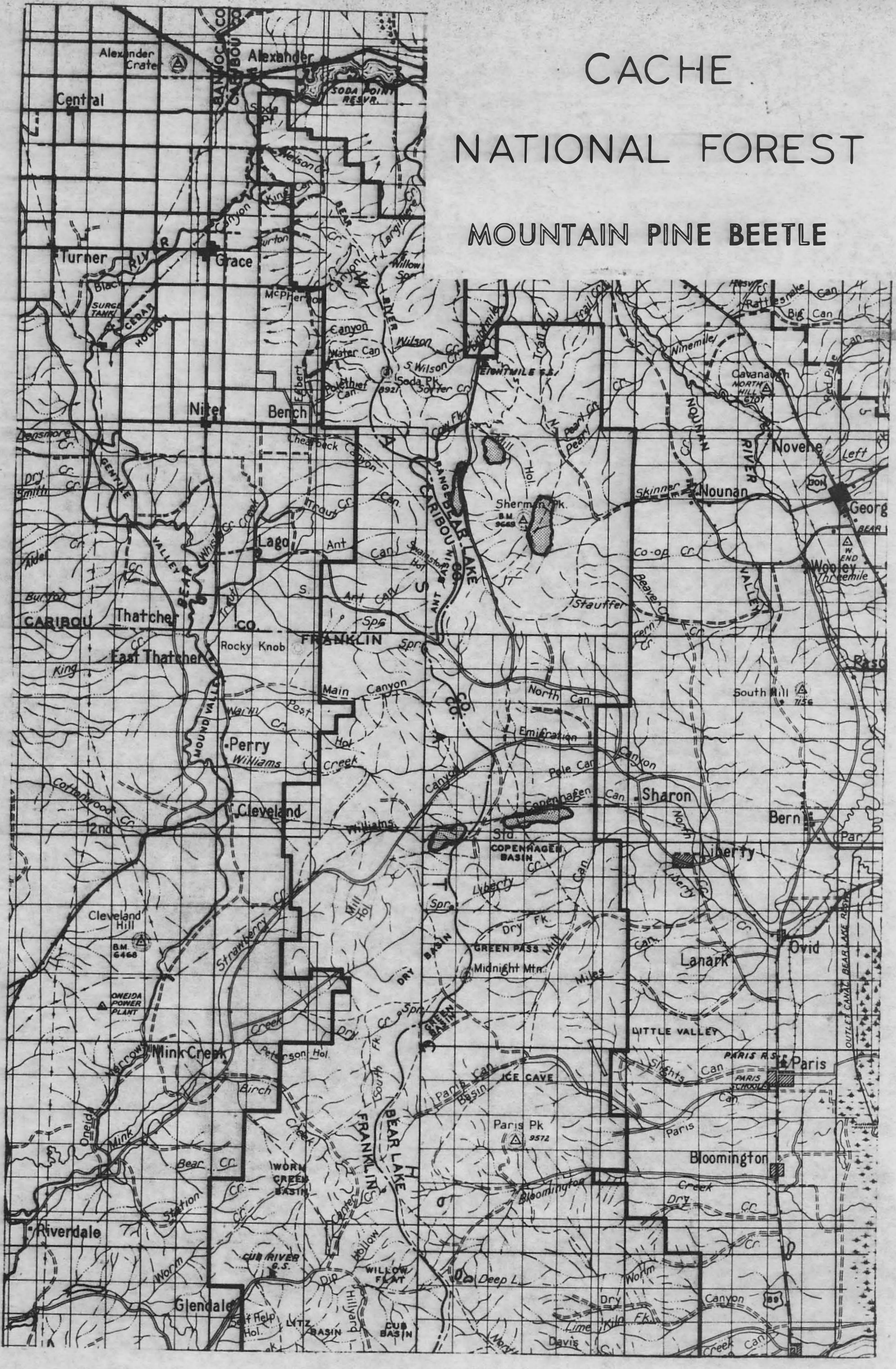
Franklin
Richmond
Logan
Hyde Park
North Logan
Providence
Paradise
Garden City
Fish Haven
St. Charles
Meadowville
IDAHO
UTAH
FRANKLIN CO.
CACHE CO.
BEAR RIVER RANGE
LOGAN RIVER
Tony Grove Lake
Naomi Pk.
Mt. Elmer
Mt. Jardine
Logan Pk.
Doubletop Mtn.
Beaver Summit
Swan Cr. Mtn.
Strawberry Valley
Blacksmith Fork R.S.
Mahogany Range

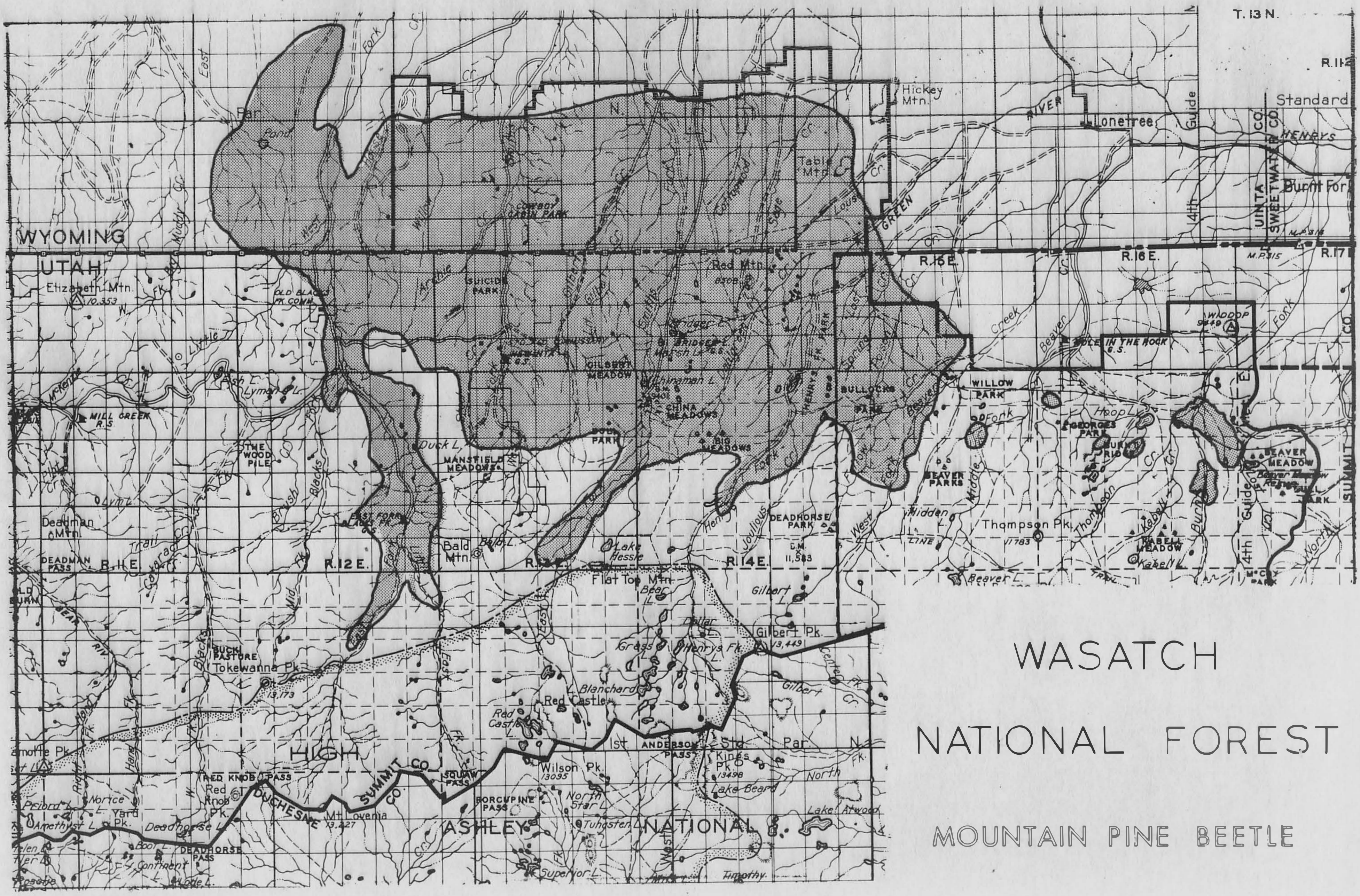
# CACHE NATIONAL FOREST

## MOUNTAIN PINE BEETLE

# CACHE NATIONAL FOREST

## MOUNTAIN PINE BEETLE

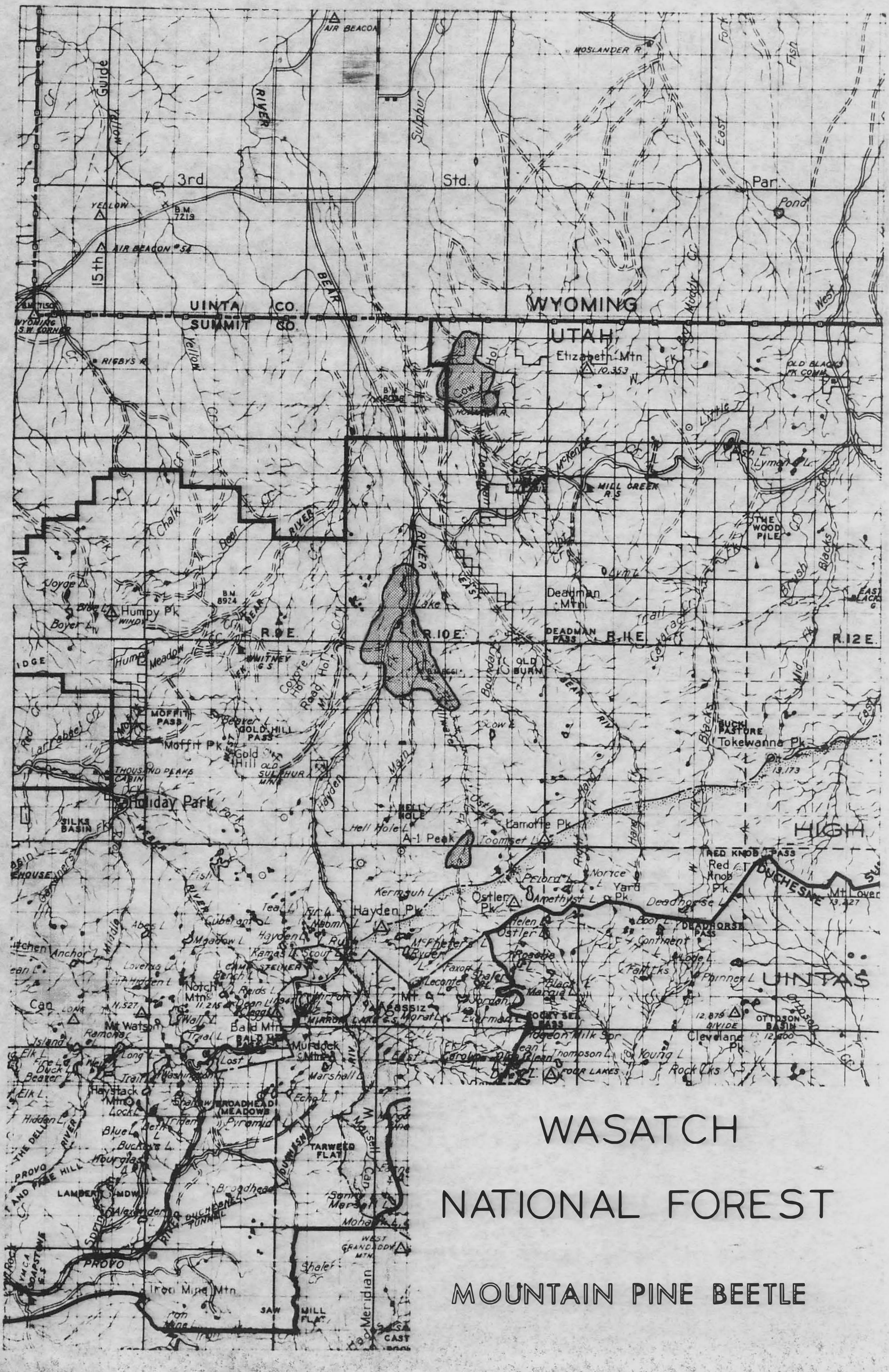

Alexander Crater
Alexander
Central
SODA POINT RESVR.
Soda Pt.
Turner
Grace
Nelson Cr.
Bear River
McPherson
Soda Pk.
Niter
Bench
Eightmile
Trail Can.
Ninemile
Big Can.
Rattlesnake Can.
Cavanaugh
Nounan River
Novene
Nounan
Georg
Sherman Pk.
Densmore Cr.
Gentile Valley
Lago
Thatcher
East Thatcher
CARIBOU CO.
FRANKLIN
Rocky Knob
Main Canyon
Perry
Williams Cr.
Cleveland
Cleveland Hill
Oneida Power Plant
Mink Creek
Riverdale
Glendale
Cottonwood Cr.
Strawberry Cr.
Peterson Hol.
Emigration Canyon
Copenhagen
Copenhagen Basin
Sharon
Liberty
Bern
Dry Basin
Green Pass
Midnight Mtn.
Lanark
Ovid
Little Valley
Ice Cave
Paris
Paris R.S.
Paris Pk
Bloomington
Worm Creek Basin
Cub River G.S.
Willow Flat
Litz Basin
Cub Basin
Deep L.
South Hill
Wooley
Co-op Cr.
Stauffer
Beaver Cr.
Bear Lake Co.
Caribou Co.
Franklin Co.


T.13N.
R.112
WYOMING
UTAH
Hickey Mtn.
Standard
Lonetree
RIVER
GREEN
HENRYS
Burnt Fork
UINTA CO.
SWEETWATER CO.
Table Mtn.
COWBOY CABIN PARK
SUICIDE PARK
Red Mtn.
Elizabeth Mtn.
10,353
OLD BLACKS FK COMM.
Bridger
BRIDGER L.
Marsh L.
GILBERT MEADOW
Chinaman L.
CHINA MEADOWS
BIG MEADOWS
BULLOCKS PARK
WILLOW PARK
HOLE IN THE ROCK G.S.
WIDDOP
GEORGES PARK
Hoop L.
BEAVER PARKS
BEAVER MEADOW
MILL CREEK R.S.
Ash L.
Lyman L.
THE WOOD PILE
Duck L.
MANSFIELD MEADOWS
EAST FORK
Deadman Mtn.
DEADMAN PASS
R.11E.
R.12E.
R.13E.
R.14E.
R.15E.
R.16E.
R.17
Bald Mtn.
Lake Hessie
Flat Top Mtn.
DEADHORSE PARK
Thompson Pk.
11783
KABELL MEADOW
Kabell L.
Beaver L.
Gilbert Pk.
13,449
Henrys Fk.
Dollar L.
Grass L.
BUCK PASTURE
Tokewanna Pk.
13,173
Blanchard L.
Red Castle
Red Castle L.
HIGH
UINTAS
Wilson Pk.
13095
ANDERSON PASS
Kings Pk.
13498
Lake Beard
Lake Atwood
SQUAW PASS
PORCUPINE PASS
North Star L.
Tungsten L.
Superior L.
Timothy
RED KNOB PASS
Red Knob Pk.
DUCHESNE CO.
SUMMIT CO.
Mt Lovenia
13,227
ASHLEY
NATIONAL
Deadhorse L.
DEADHORSE PASS
Continent
Amethyst L.
Norice L.
Yard Pk.
Lamotte Pk.
OLD BURN
BEAR RIV.
SUMMIT CO.
McCOY PARK

WASATCH

NATIONAL FOREST

MOUNTAIN PINE BEETLE

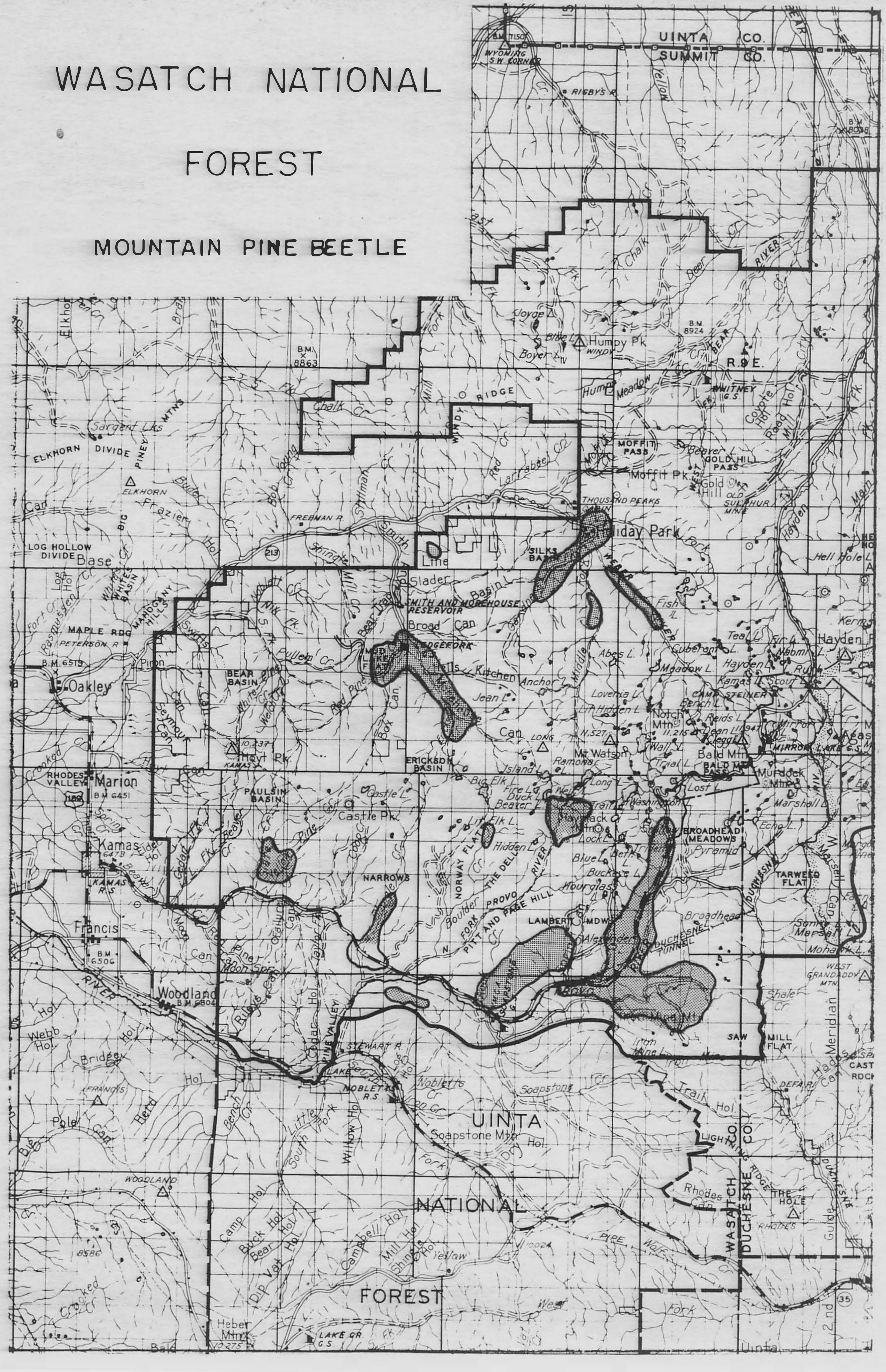

WYOMING
UTAH
UINTA CO.
SUMMIT CO.
3rd Std. Par.
15th
BEAR RIVER
Sulphur
Elizabeth Mtn
10,353
Mill Creek R.S.
The Wood Pile
Deadman Mtn
Deadman Pass
R.9E.
R.10E.
R.11E.
R.12E.
Humpy Pk
Moffit Pass
Moffit Pk
Gold Hill Pass
Whitney G.S.
Holiday Park
Silks Basin
Weber River
Hayden Pk
Lamotte Pk
A-1 Peak
Tokewanna Pk
13,173
Red Knob Pass
Mt Lovenia
13,227
Deadhorse Pass
HIGH
UINTAS
Mt Watson
Notch Mtn
Bald Mtn
Murdock Mtn
Mirror Lake G.S.
Agassiz
Rocky Sea Pass
Four Lakes
Cleveland Pk
Ottoson Basin
Broadhead Meadows
Tarweed Flat
Provo River
Duchesne River
Iron Mine Mtn
Mill Flat
Meridian

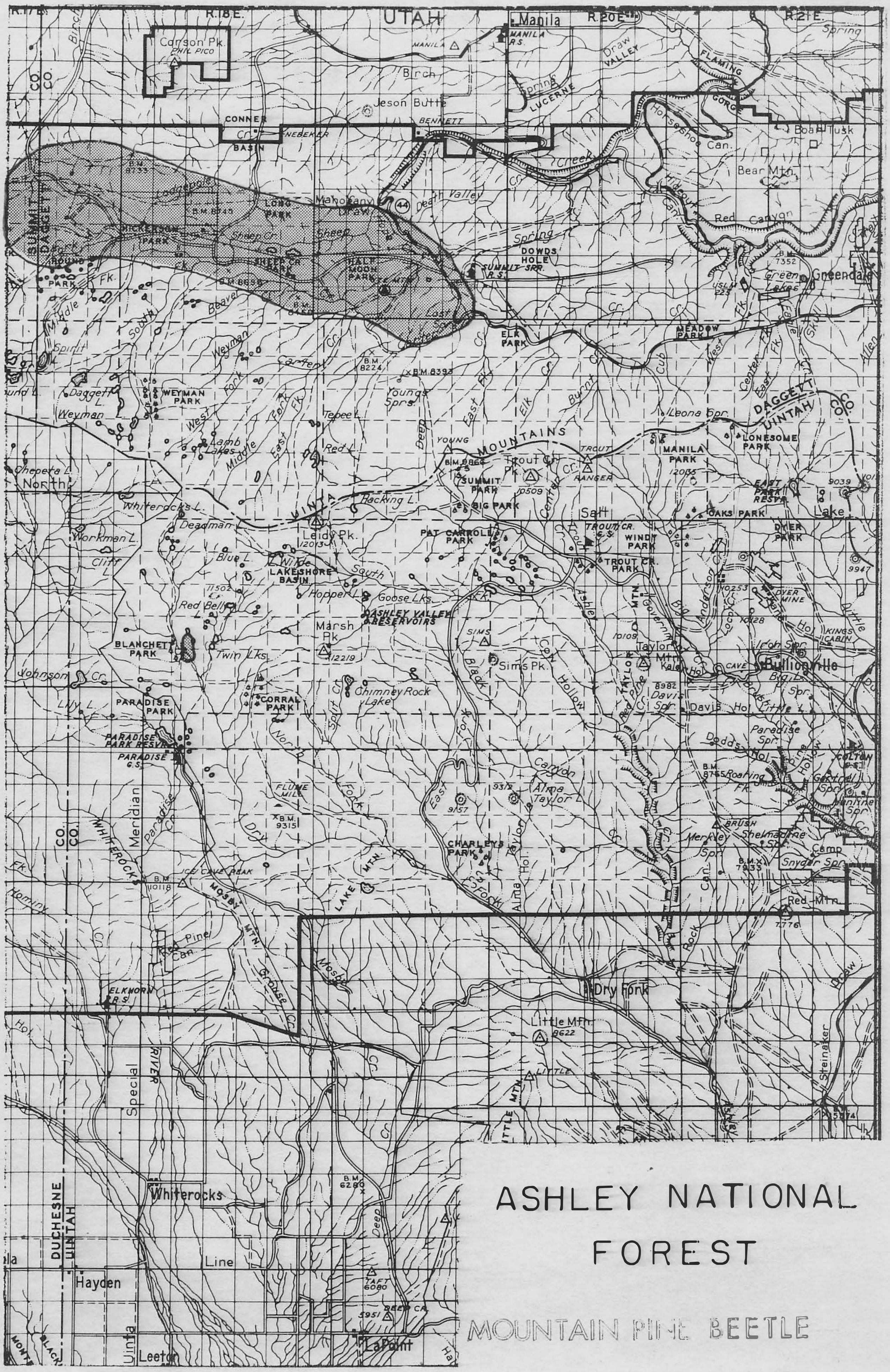
# WASATCH
# NATIONAL FOREST

## MOUNTAIN PINE BEETLE

# WASATCH NATIONAL FOREST

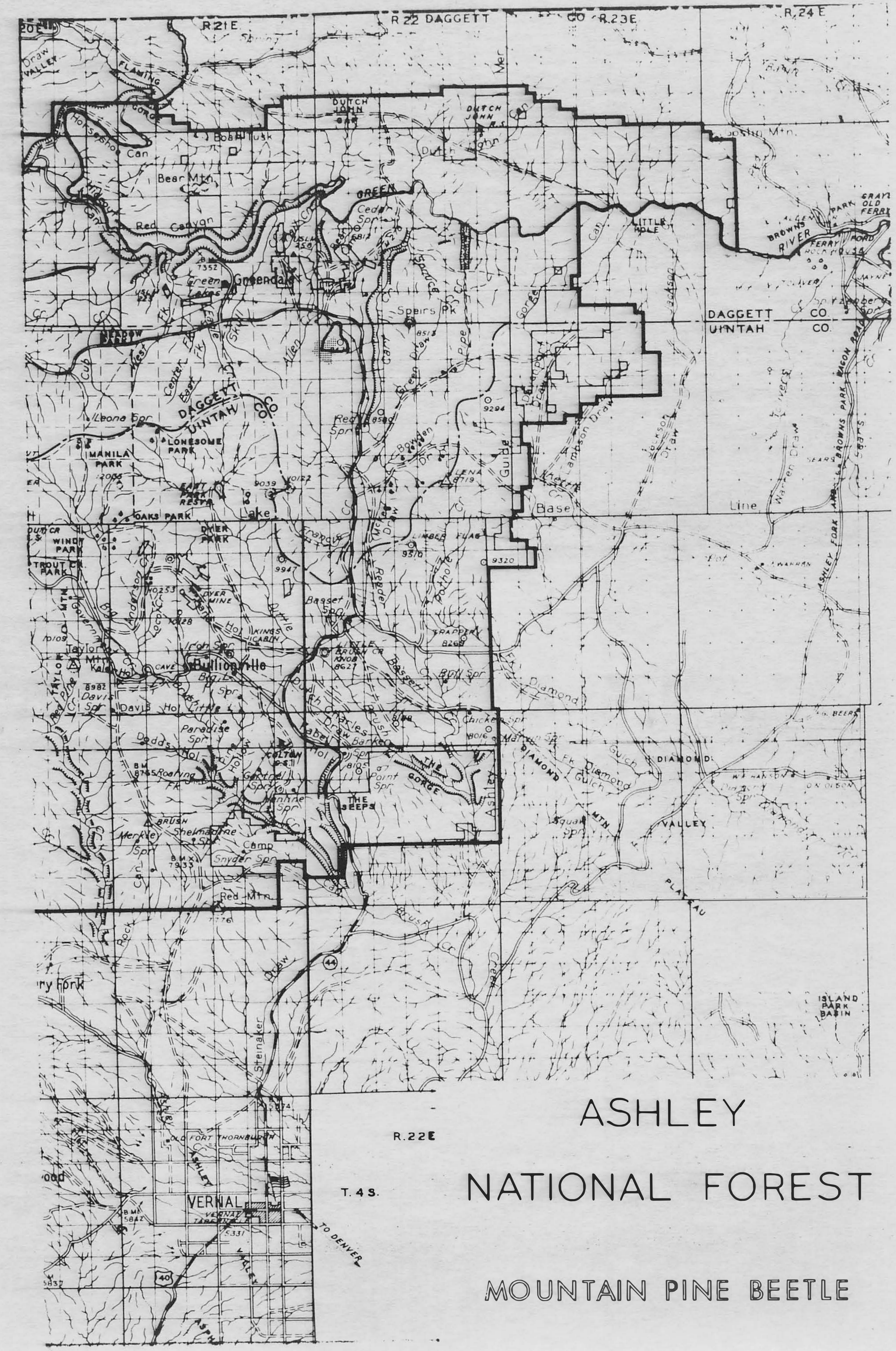
## MOUNTAIN PINE BEETLE


UINTA CO.
SUMMIT CO.
WYOMING S.W. CORNER
RIGBY'S R.
Humpy Pk
Joyce L.
Boyer L.
R.9 E.
WINDY RIDGE
Chalk Cr.
Sargent Lks
ELKHORN DIVIDE
PINEY MTNS
ELKHORN
Frazier
LOG HOLLOW DIVIDE
Base Line
213
Bob Young
Stillman Cr.
Larrabee Cr.
MOFFIT PASS
Moffit Pk.
GOLD HILL PASS
THOUSAND PEAKS
Holiday Park
SILKS BASIN
Slader Basin
SMITH AND MOREHOUSE RESERVOIR
Broad Can
LEDGEFORK
Kitchen
Anchor
Jean L.
Abes L.
Meadow L.
Lovenia L.
Hayden L.
Kamas L.
Scout L.
CAMP STEINER
Notch Mtn
Bald Mtn
BALD MTN PASS
Murdock Mtn
MIRROR LAKE G.S.
Mt Watson
Wall L.
Trial L.
Lost L.
Marshall L.
Echo L.
MAPLE RDG
PETERSON R
Oakley
Piron
BEAR BASIN
Pullem Cr.
Red Pine
Box Can
Hoyt Pk
ERICKSON BASIN
RHODES VALLEY
Marion
189
Kamas
KAMAS R.S.
PAULSIN BASIN
Castle L.
Castle Pk.
Big Elk L.
Island L.
Fire L.
Duck L.
Beaver L.
Haystack Mtn
Lock L.
Washington
BROADHEAD MEADOWS
Pyramid
Lit. Elk L.
Hidden L.
NORWAY FLAT
THE DELL
Blue L.
Beth L.
Buckeye L.
Hourglass L.
NARROWS
PROVO RIVER
PITT AND PAGE HILL
LAMBERT MDW
DUCHESNE TUNNEL
Broadhead L.
TARWEED FLAT
Francis
Woodland
Moon Can
Rileys Can
PINE VALLEY
STEWART R.
LAKE
NOBLETTS R.S.
Webb Hol
Bridge Hol
FRANCIS
Pole Can
Herd Hol
Bench Cr.
Little South Fork
Willow Hol
UINTA
Soapstone Mtn
Soapstone Cr.
NATIONAL
FOREST
WOODLAND
Camp Hol
Buck Hol
Bear Hol
Dip Vat Hol
Campbell Hol
Mill Hol
Shingle Hol
Yellow
Heber Mtn
LAKE CR. G.S.
Crooked Cr.
8586
Iron Mine
SAW MILL FLAT
WEST GRANDADDY MTN
Shale Cr.
LIGHTNING RIDGE
Rhodes Can
WASATCH CO.
DUCHESNE CO.
THE HOLE
Meridian
35
Uinta


UTAH
R.18E.
R.20E.
R.21E.
Manila
MANILA R.S.
Carson Pk.
Birch
Jeson Butte
CONNER BASIN
BENNETT
Draw VALLEY
LUCERNE
FLAMING GORGE
Horseshoe Can.
Boar Tusk
Bear Mtn.
Red Canyon
Greendale
Green Lakes
SUMMIT
DAGGETT
Lodgepole
LONG PARK
DICKERSON PARK
SHEEP CR. PARK
HALF MOON PARK
ROUND PARK
Mahogany Draw
44
Death Valley
DOWDS HOLE
SUMMIT R.S.
ELK PARK
MEADOW PARK
Middle Fk.
South
Beaver
Spirit
Daggett L.
Weyman
WEYMAN PARK
Carter
Youngs Sprs.
Tepee L.
Lamb Lakes
Red L.
DAGGETT
UINTAH
CO.
Leona Spr.
MANILA PARK
LONESOME PARK
EAST PARK RESVR.
OAKS PARK
DYER PARK
UINTA MOUNTAINS
Trout Cr. Pk.
SUMMIT PARK
BIG PARK
Hacking L.
Leidy Pk.
Whiterocks L.
Chepeta L.
North
Deadman
Workman L.
Cliff L.
PAT CARROLL PARK
TROUT CR. G.S.
WINDY PARK
TROUT CR. PARK
Blue L.
Wilde
LAKESHORE BASIN
Hopper L.
Goose Lks.
ASHLEY VALLEY RESERVOIRS
Red Belly L.
Marsh Pk.
BLANCHETT PARK
Twin Lks.
Sims Pk.
Taylor Mtn.
Bullionville
DYER MINE
KINGS CABIN
Iron Spr.
Johnson Cr.
Lily L.
PARADISE PARK
PARADISE PARK RESVR.
PARADISE G.S.
CORRAL PARK
Chimney Rock Lake
Davis Spr.
Davis Hol.
Paradise Spr.
Dodds Hol.
Roaring Fk.
COLTON G.S.
Cottrell Spr.
Meridian
Paradise Cr.
WHITEROCKS
Dry Fork
FLUME MILE
East Fork
Alma Taylor L.
CHARLEYS PARK
Merkley Spr.
BRUSH
Shelmadine Spr.
Snyder Spr.
Camp
Hominy
ICE CAVE PEAK
MOSBY MTN.
LAKE MTN.
Alma Hol.
Red Mtn.
Red Pine Can.
Mosby
Grouse Cr.
Dry Fork
Little Mtn.
LITTLE
LITTLE MTN.
ELKHORN R.S.
Special
RIVER
Whiterocks
Deep
DUCHESNE
UINTAH
Hayden
Line
TAFT
DEEP CR.
Uinta
Leeton
LaPoint
Steinaker
Ashley

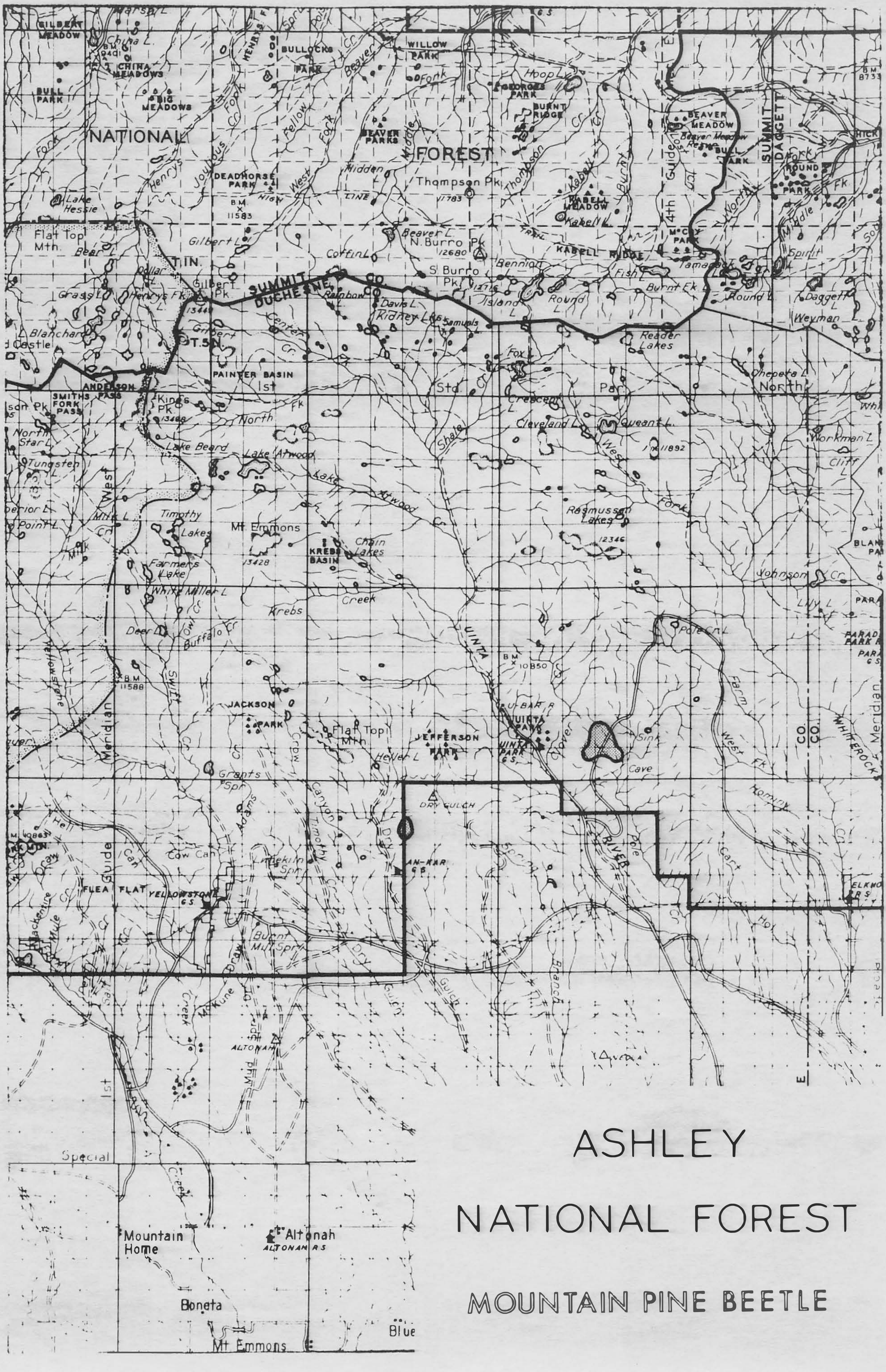
# ASHLEY NATIONAL FOREST

MOUNTAIN PINE BEETLE


R.21E.
R.22 DAGGETT CO. R.23E.
R.24E
DAGGETT CO.
UINTAH CO.
GREEN RIVER
BROWNS PARK
Greendale
Bullionville
VERNAL
TO DENVER
R.22E
T.4S.

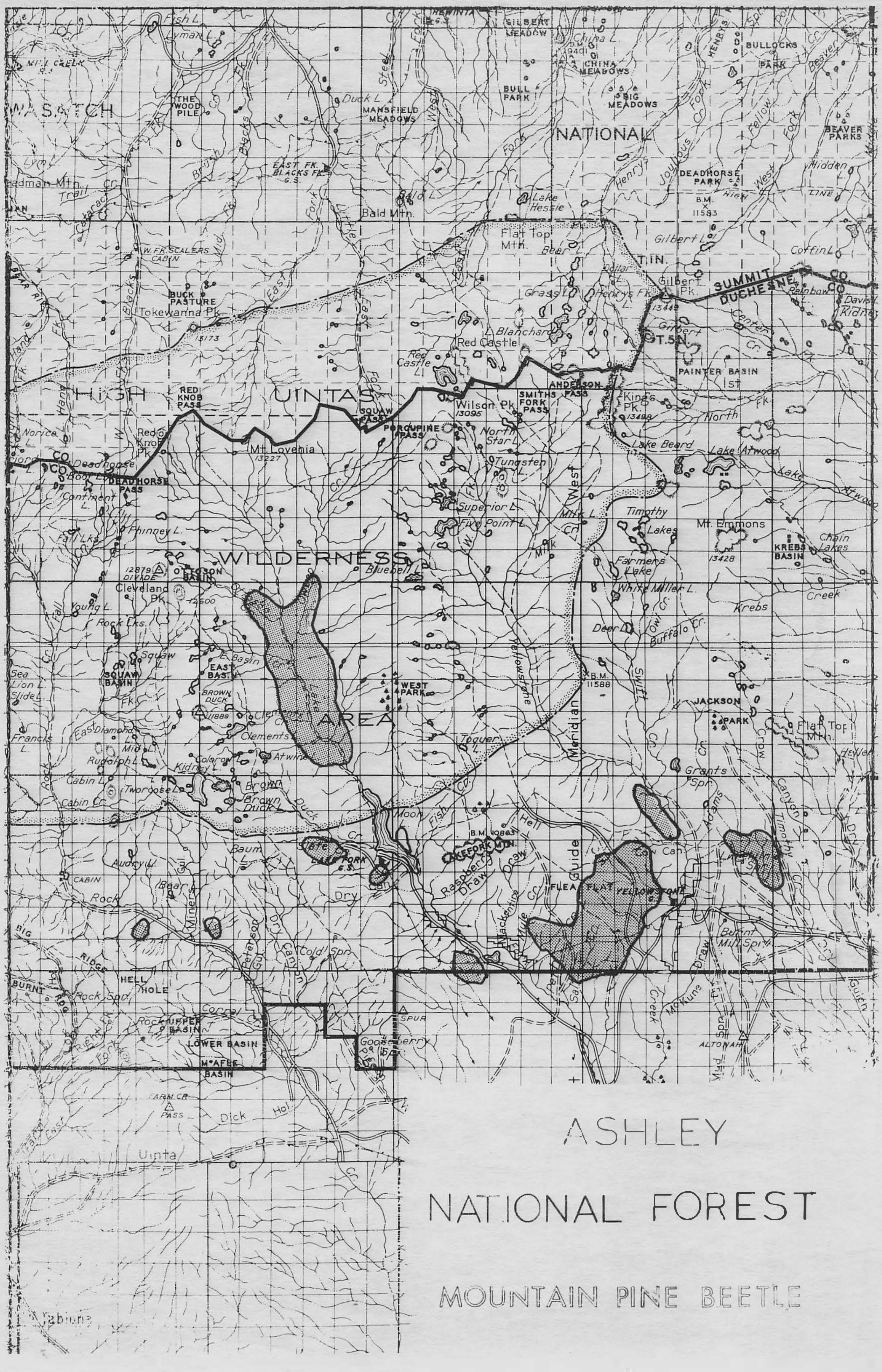
# ASHLEY NATIONAL FOREST

## MOUNTAIN PINE BEETLE

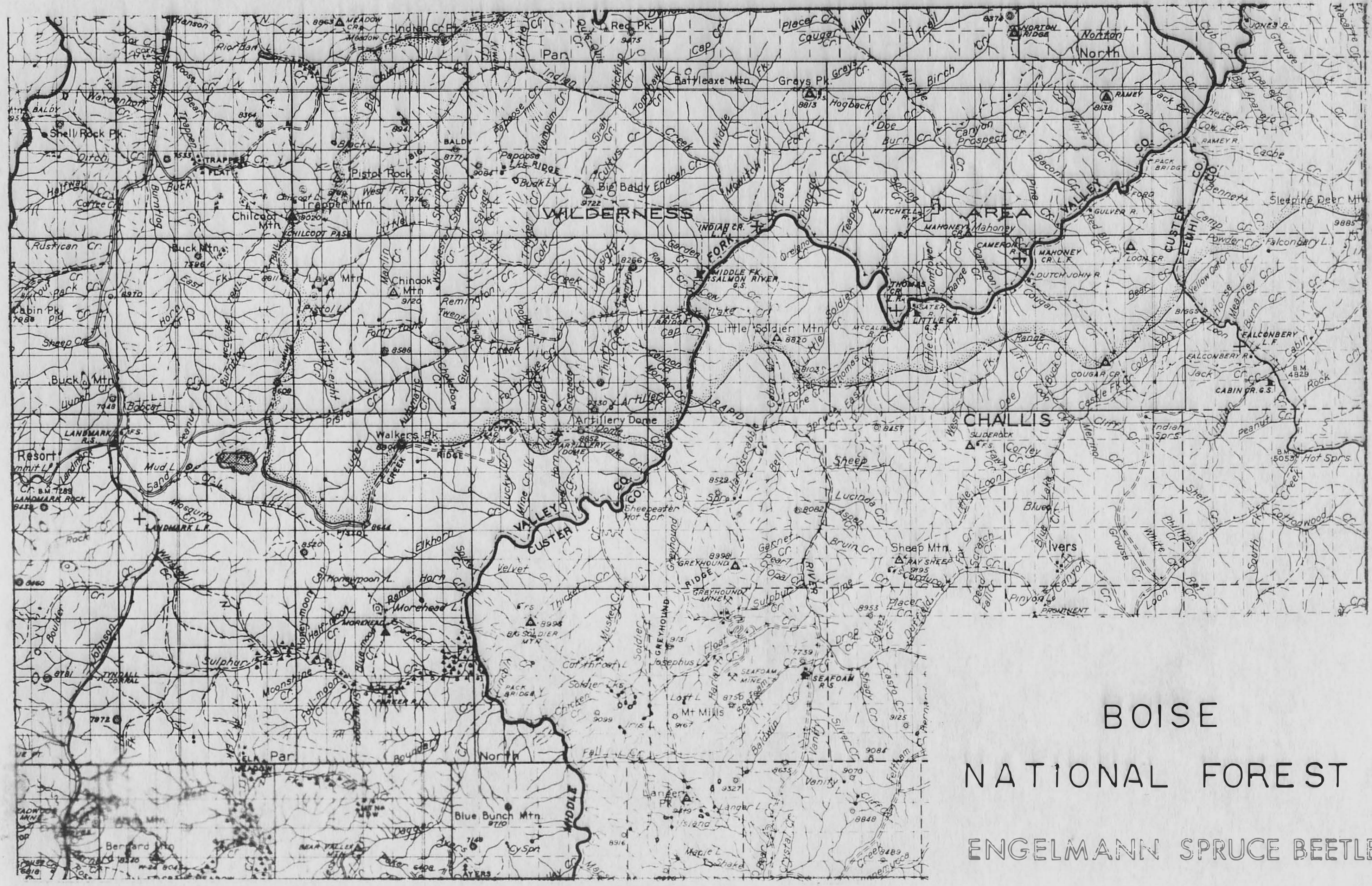

GILBERT MEADOW
China L.
CHINA MEADOWS
BULL PARK
BIG MEADOWS
BULLOCKS PARK
WILLOW PARK
Hoop L.
GEORGES PARK
BURNT RIDGE
BEAVER MEADOW
NATIONAL
FOREST
SUMMIT
DAGGETT
DEADHORSE PARK
BEAVER PARKS
Thompson Pk
Lake Hessie
Flat Top Mth.
Gilbert L.
Coffin L.
Beaver L.
N. Burro Pk.
KABELL MEADOW
KABELL RIDGE
M'COY PARK
S. Burro Pk.
Bennion L.
Fish L.
Burnt Fk. L.
Round L.
Daggett L.
Weyman L.
SUMMIT
DUCHESNE CO.
Gilbert Pk.
Rainbow L.
Davis L.
Ridge L.
Samuels L.
Island L.
Round L.
Reader Lakes
T.1N.
T.1S.
R.
Blanchard L.
Castle
ANDERSON PASS
SMITHS FORK PASS
PAINTER BASIN
King's Pk
Fox L.
Crescent L.
Cleveland L.
Queant L.
Chepeta L.
North
Workman L.
Cliff L.
North Star L.
Tungsten L.
Lake Beard
Lake Atwood
Timothy Lakes
Mt. Emmons
KREBS BASIN
Chain Lakes
Rasmussen Lakes
Farmers Lake
White Miller L.
Deer L.
Krebs Creek
Johnson Cr.
Lily L.
Pole Cr. L.
UINTA
JACKSON PARK
Flat Top Mtn
JEFFERSON PARK
U-BAR R
UINTA PARK
Heller L.
Grants Spr
DRY GULCH
Cave
Sink
Farm Cr.
West Fk.
WHITEROCKS
Meridian
CO.
CO.
AN-KAR G.S.
RIVER
Cow Can.
Limekiln Spr.
FLEA FLAT
YELLOWSTONE G.S.
Guide
Meridian
Burnt Mill Spr.
Dry Gulch
Gulch
M'Kune
ALTONAH
Special
Mountain Home
Altonah
ALTONAH R.S.
Boneta
Mt Emmons
Blue
ELKHORN R.S.
PARADISE PARK

# ASHLEY NATIONAL FOREST

## MOUNTAIN PINE BEETLE


WASATCH
NATIONAL
HIGH UINTAS
WILDERNESS AREA
Fish L.
Lyman L.
Hewinta G.S.
Gilbert Meadow
China L.
China Meadows
Bullocks Park
Bull Park
Big Meadows
The Wood Pile
Duck L.
Mansfield Meadows
Beaver Parks
East Fk. Blacks Fk. G.S.
Deadhorse Park
Bald Mtn.
Lake Hessie
Flat Top Mtn.
Tokewanna Pk.
Buck Pasture
W. Fk. Scalers Cabin
Gilbert Pk.
Summit Co.
Duchesne Co.
Red Castle
Painter Basin
Red Knob Pass
Squaw Pass
Porcupine Pass
Anderson Pass
Smiths Fork Pass
Wilson Pk. 13095
Kings Pk. 13498
Mt. Lovenia 13227
Deadhorse Pass
Lake Beard
Lake Atwood
Tungsten L.
Superior L.
Five Point L.
Timothy Lakes
Mt. Emmons 13428
Krebs Basin
Chain Lakes
Farmers Lake
White Miller L.
Bluebell L.
O'Sullivan Basin
Cleveland Pk.
Squaw Basin
East Basin
Brown Duck
West Park
Jackson Park
Flat Top Mtn.
Clements L.
Atwine
Kidney L.
Brown Duck
Moon Lake
Lakefork Mtn.
Flea Flat
Yellowstone
Lake Fork G.S.
Raspberry Draw
Big Ridge
Hell Hole
Burnt Rdg.
Upper Basin
Lower Basin
McAfee Basin
Altonah
Uinta
Fabiana

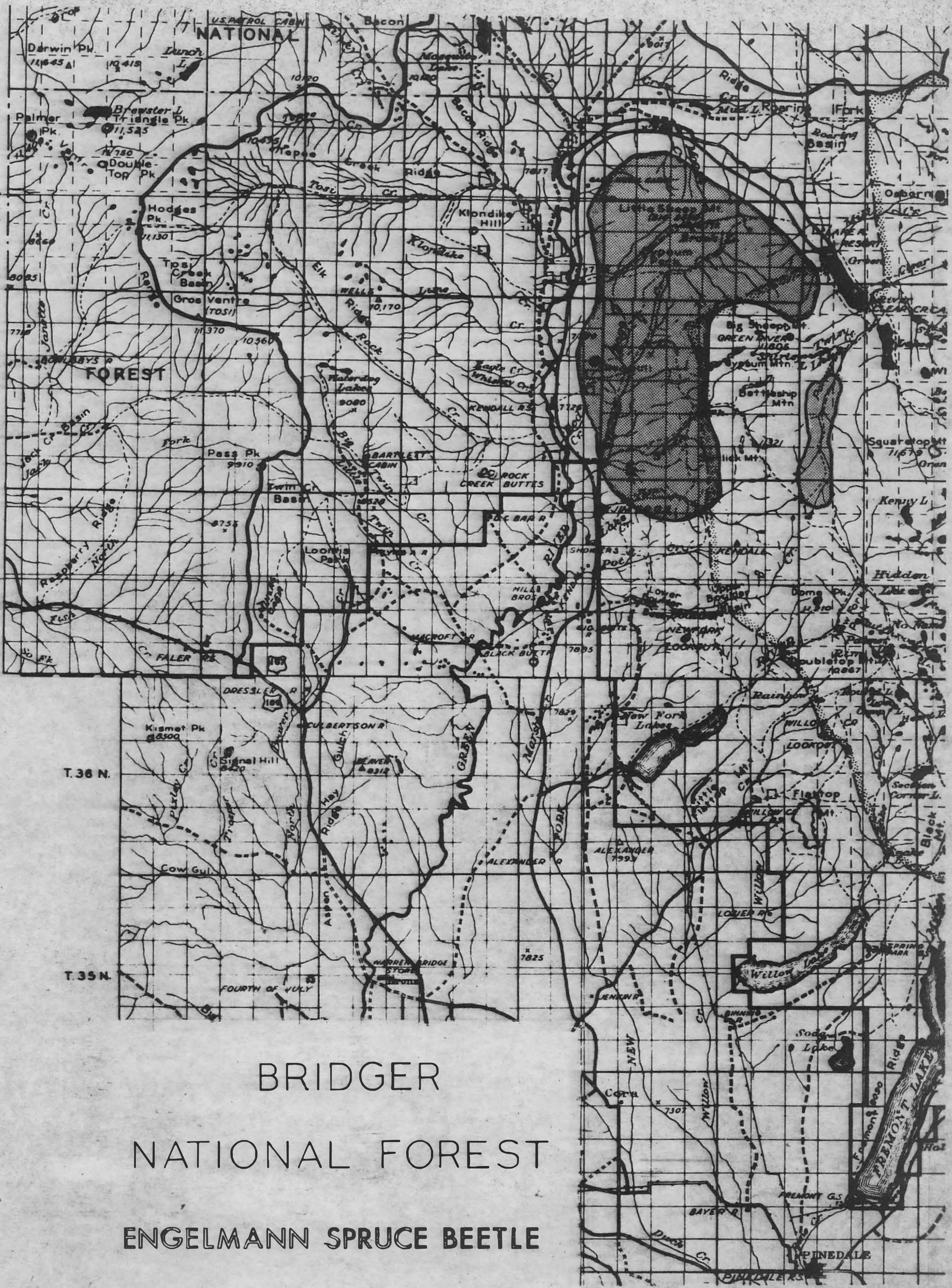
# ASHLEY
# NATIONAL FOREST
## MOUNTAIN PINE BEETLE


WILDERNESS
AREA
CHALLIS
MIDDLE FK.
SALMON RIVER
VALLEY CO.
CUSTER CO.
LEMHI CO.
RAPID RIVER
Walkers Pk.
Artillery Dome
Big Baldy
Chinook Mtn.
Little Soldier Mtn.
Sheep Mtn.
Ivers
Seafoam R.S.
Blue Bunch Mtn.

BOISE

NATIONAL FOREST

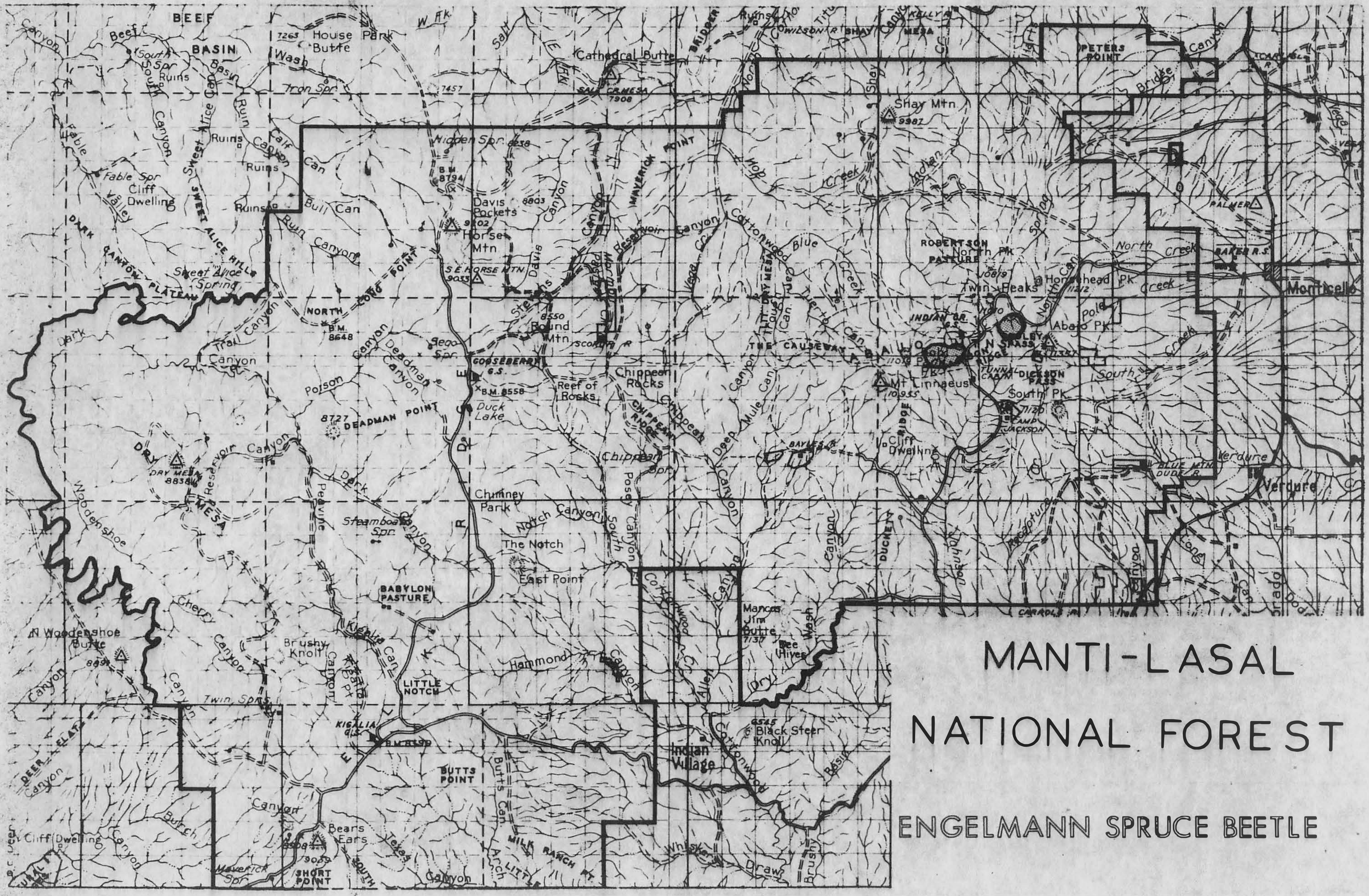
ENGELMANN SPRUCE BEETLE


NATIONAL
FOREST
T.39 N.
T.38 N.
T.37 N.
T.36 N.
T.35 N.
TO JACKSON
Darwin Pk.
Brewster L.
Triangle Pk.
Palmer Pk.
Double Top Pk.
Hodges Pk.
Tosi Creek Basin
Gros Ventre (TOSI)
Klondike Hill
Elk Ridge
Rock Cr.
Waterdog Lake
Pass Pk
Twin Cr. Basin
Loomis Park
Kismet Pk
Signal Hill
Cow Gul.
Big Sheep Mt.
Battleship Mtn
Squaretop Mt.
Kenny L.
Doubletop Mtn
New Fork Lakes
Flattop Mt.
Willow Lake
Soda Lake
FREMONT LAKE
Cora
PINEDALE
GREEN RIVER
Roaring Fork
Kendall R.S.
Rock Creek Buttes
Warren Bridge
Alexander
Fremont G.S.

# BRIDGER

# NATIONAL FOREST

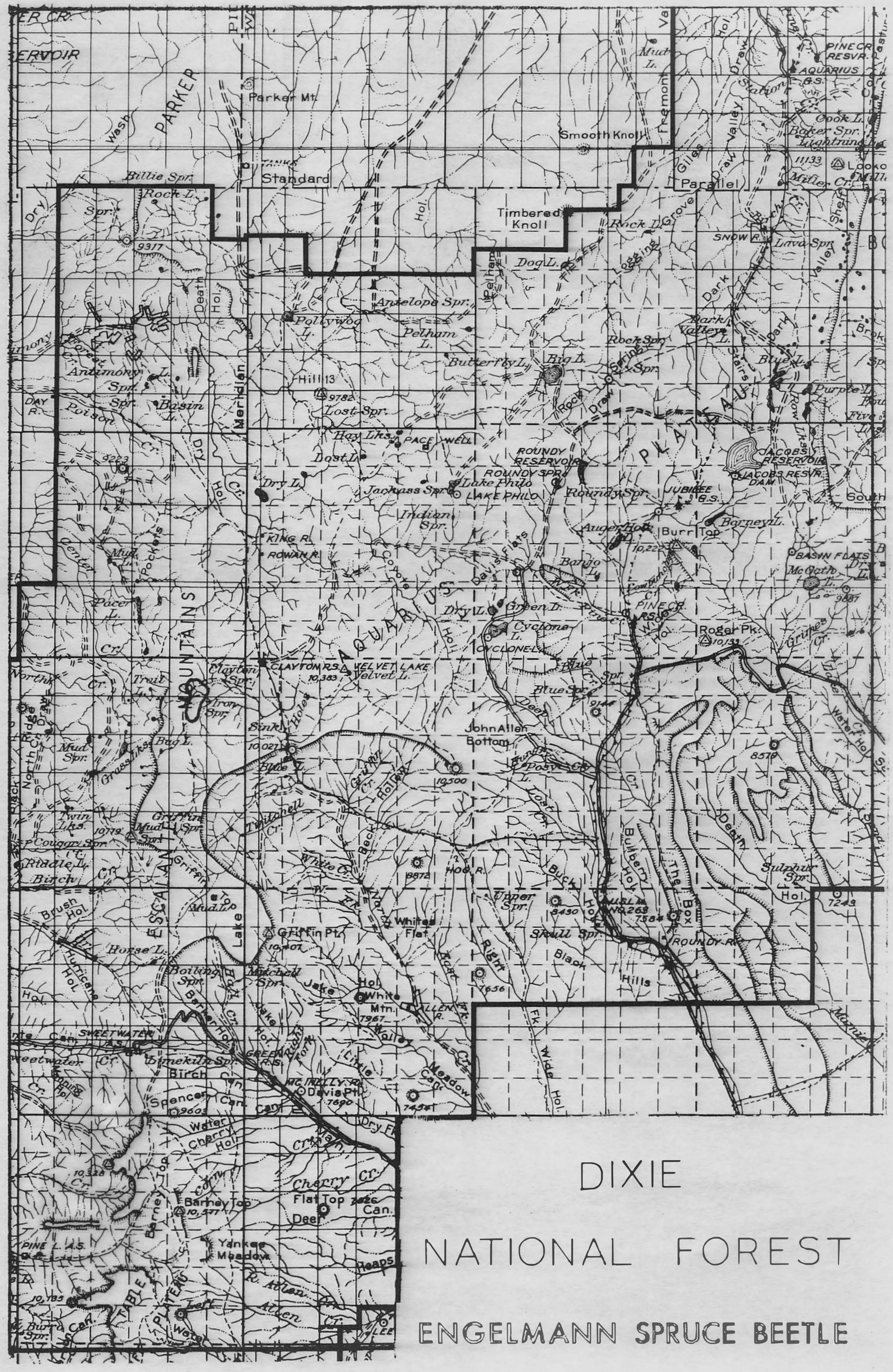
# ENGELMANN SPRUCE BEETLE



# MANTI-LASAL NATIONAL FOREST

## ENGELMANN SPRUCE BEETLE

BEEF BASIN
Beef
South Spr
Ruins
South Canyon
Fable Valley
Fable Spr
Cliff Dwelling
Sweet Alice Can
SWEET ALICE HILLS
Sweet Alice Spring
DARK CANYON PLATEAU
Dark Canyon
Basin
Ruin Canyon
Calf Canyon
Bull Can
Ruins
7263
House Park Butte
Wash
Iron Spr
7457
W Fk
Salt
E Fk
Cathedral Butte
SALT CR MESA
7908
BRIDGER
Ruins
Cottonwood
WILSON R
SHAY
KELLY R
MESA
Titus
Shay Canyon
Shay Mtn
9987
PETERS POINT
Bridge
Canyon
Hidden Spr
8838
B.M. 8794
Davis Pockets
8803
Horse Mtn
9202
S.E. HORSE MTN
9055
Davis Canyon
MAVERICK POINT
Reservoir Canyon
N. Cottonwood
Hop Creek
Indian Creek
Vega Cr
DRY MESA
Blue Creek
Tuerto
Can
Spring
ROBERTSON PASTURE
North Pk
10019
Twin Peaks
Horsehead Pk
11312
North Creek
BAKER R.S.
PALMER
Monticello
Abajo Pk
Pole Creek
INDIAN CR. G.S.
THE CAUSEWAY
ABAJO
Mt Linnaeus
10955
RIDGE
TUNNEL CAMP
DICKSON PASS
South Pk
11360
CAMP JACKSON
South Creek
Cliff Dwelling
BAYLES R
DUCKETT
Johnson
Recapture
BLUE MTN DUDE R
Verdure
Long Can
Dodge
CARROLS R
NORTH
LONG POINT
B.M. 8648
Trail Canyon
Sego Spr
GOOSEBERRY G.S.
B.M. 8558
Duck Lake
Round Mtn
8550
Stevens
SCORUP R
Reef of Rocks
Chippean Rocks
CHIPPEAN RIDGE
Chippean Spr
Deadman Canyon
Poison Canyon
8727
DEADMAN POINT
DRY MESA
8838
DRY MESA
Reservoir Canyon
Peavine
Dark Canyon
Steamboat Spr
Chimney Park
Notch Canyon
South Canyon
Posey Canyon
Deep Mule Can
The Notch
East Point
Woodenshoe
N Woodenshoe Butte
8891
Cherry Canyon
Canyon
Twin Sprs
BABYLON PASTURE
Brushy Knoll
Kigalia Can
Kigalia Pt
LITTLE NOTCH
Hammond Canyon
Cottonwood
Allen Canyon
Mancos Jim Butte
7137
Bee Hives
Dry Wash
6545
Black Steer Knoll
Indian Village
Basin
KIGALIA G.S.
B.M. 8559
BUTTS POINT
Butts Can
MILK RANCH PT
LITTLE
Arch Canyon
Texas Canyon
Whiskers Draw
Brushy
DEER FLAT
Burch Canyon
Cliff Dwelling
Bears Ears
8508
9052
SHORT POINT
SOUTH
Maverick Spr
Canyon
ELK RIDGE


Parker Mt.
PARKER
Wash
Standard
Smooth Knoll
Timbered Knoll
Billie Spr.
Rock L.
Dog L.
Antelope Spr.
Pollywog L.
Pelham L.
Butterfly L.
Big L.
Rock Spr.
Spring Spr.
Antimony Spr.
Basin L.
Hill 13
9782
Lost Spr.
Hay Lks.
PACE WELL
Lost L.
Dry L.
Jackass Spr.
LAKE PHILO
ROUNDY RESERVOIR
ROUNDY SPR.
Roundy Spr.
JUBILEE G.S.
JACOBS RESERVOIR
JACOBS RESVR. DAM
Indian Spr.
KING R.
ROWAN R.
Auger Hole
Burr Top
10,222
Barney L.
Banjo L.
Dry L.
Green L.
Cyclone L.
CYCLONE L.
PINE CR. R.S.
Roger Pk.
10,133
BASIN FLATS
McGath L.
AQUARIUS
PLATEAU
MOUNTAINS
ESCALANTE
CLAYTON R.S.
VELVET LAKE
Velvet L.
10,383
Clayton Spr.
Iron Spr.
Sink
10,027
Blue L.
Blue Spr.
John Allen Bottom
Posy L.
10,500
Twitchell Cr.
Griffin Spr.
Mud Spr.
10,779
Twin Lks.
Cougar Spr.
Riddle L.
Birch Cr.
8872
HOG R.
Upper Spr.
8430
Bullberry Hol.
The Box
NO. 269
7584
ROUNDY R.
Sulphur Spr.
8579
7243
Griffin Pt.
10,407
Whites Flat
Skull Spr.
Black Hills
Horse L.
Boiling Spr.
Mitchell Spr.
White Mtn.
7967
ALLEN R.
7656
SWEETWATER R.S.
Sweetwater Cr.
Limekiln Spr.
GREEN R.S.
MC INELLY R.
Davis Pt.
7690
Spencer
9603
Meadow Can.
7454
Cherry Cr.
Flat Top
7826
Barney Top
10,577
Yankee Meadow
Heaps
PINE L. R.S.
TABLE CLIFF PLATEAU
10,135
Allen Cr.
LEE
PINE CR. RESVR.
AQUARIUS G.S.
Cook L.
Baker Spr.
Lightning L.
11133
Parallel
SNOW R.
Lava Spr.
Dark Valley L.
Blue L.
Purple L.
Five Lks.
Stairs
Meridian

DIXIE

NATIONAL FOREST

ENGELMANN SPRUCE BEETLE